

The Iron Age

INDEX TO
READING MATTER
PAGE 30

A Review of the Hardware, Iron and Metal Trades.

INDEX TO
ADVERTISEMENTS
PAGE 16

Published every Thursday Morning by DAVID WILLIAMS, Nos. 66 and 68 Duane Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XL: No 4.

New York, Thursday, July 28, 1887.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

The Automatic Boiler.

A boiler of new and interesting design, of the water-tube type, has just been brought out by the Chicago Automatic Boiler Company, 185 Dearborn street, Chicago, Ill. It is known as the Automatic boiler, and its main features are well shown in the engravings on this page.

It is made with two water-heads, a series of tubes through which the water circulates, a float, and a series of tubes for the drying of steam. The water-heads D are made of heavy plates of steel, and stayed by bolts, as shown in cuts. The water-tubes A open at each end into the water-heads, and are fitted into the outer sheet of each water-head, and directly opposite each water-tube, is a malleable-iron cap, N, provided with a special thread. In like manner are arranged and fitted tubes B and tubes C, the latter opening at one end into the steam-head A'. The float-chamber is located at one side of the tubes C, and is provided at each end

water-head and ascends to the steam chambers E E and to the drying tubes C C, when it passes to the engine in the usual way. By the arrangement of fire walls K, shown in Fig. 2, the course of the heat is such that it passes diagonally three times across the tubes, before it reaches the space in which are located the drying tubes or chamber, when it escapes to the smoke-stack. Thus practically the greatest amount of heat possible is obtained from the fuel for generating steam, and before it is allowed to escape it does service in super-heating. The super-heating tubes being above the water-line, will necessarily expand more than those below. To admit of this extra expansion the steam head A' is provided. Between the water-head and the steam-head A' is placed the friction roll on which the head A' moves. The blow-off cock I is located in the lowest point of the water-head, where all the impurities of the water naturally settle. The feed-pipe is preferably placed at a point above, so that the inflow of water will not continually force the sediment

grate bars; P, combustion arch; Q, ash pit; R, wheel for working stoker; S, iron plate over coal magazine.

The Comparative Value of Steam and Hot Water for Transmitting Heat and Power.*

BY CHAS. E. EMERY.

(Concluded from page 18, July 21.)

An average presentation of this branch of the subject may be had by examining the pressure available when the hot water and steam are used to furnish steam for power. In the case of the hot water, in order to evaporate about 10 per cent. of its volume into steam, the reduction in temperature will be that due to a fall in pressure of 165 pounds, or from 235 down to 70 pounds. In a steam system this entire difference of pressure may be used as the energy which transports the steam to the

one point, which has been made to appear very important on paper. The following quotation may be made:

"The fuel cost of the power developed by the steam-engines employed in [hot water] system for circulating the superheated water in the hot water pipe, for pumping the used water from the return pipe into the boiler, for driving the blowers, if a mechanical supply of air is needed for the combustion of the coal, and for hoisting coal and its refuse, will, owing to the peculiarity of the system, be not over one-twelfth of the similar cost per horse-power developed in the most economical steam engines employed in other work. In fact, the only coal required to work these circulating, pumping, blowing and hoisting steam-engines is what furnishes the heat actually transformed into work according to the thermodynamical theory, and to supply the loss of heat by conduction and radiation from the external surfaces of these engines. The cooled water from the return pipe will be in such excessive quantity compared with the feed water

plus heat will be so great that it cannot in practice be reduced to the temperature stated. The low temperature of the return water could only be secured in individual instances in buildings provided with specially large heating coils arranged to receive the water as it was about to escape to the street. Houses and public buildings already provided with heating apparatus would necessarily have connections made to the apparatus in place, and the heat would be rejected at the temperature of the steam used for heating, say at the temperature due to 5 pounds, as has been provided for in the previous calculation. In no case, as has been intimated, could it be assured that the surplus heat from the cooking apparatus would not exceed that required for other culinary operations and heating the house. In seasons when no heat was required the only economical way to dispose of the hot water at 390° rejected from the cooking apparatus would be to pump it back to the station at that temperature and at the pressure due thereto. The result would only be

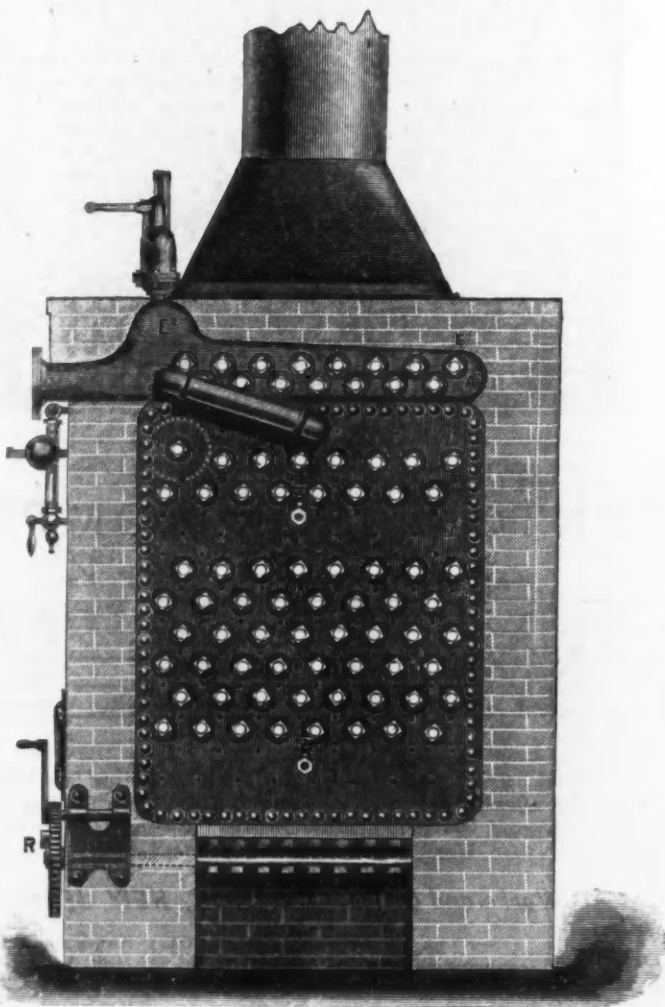


Fig. 1.—Front View.

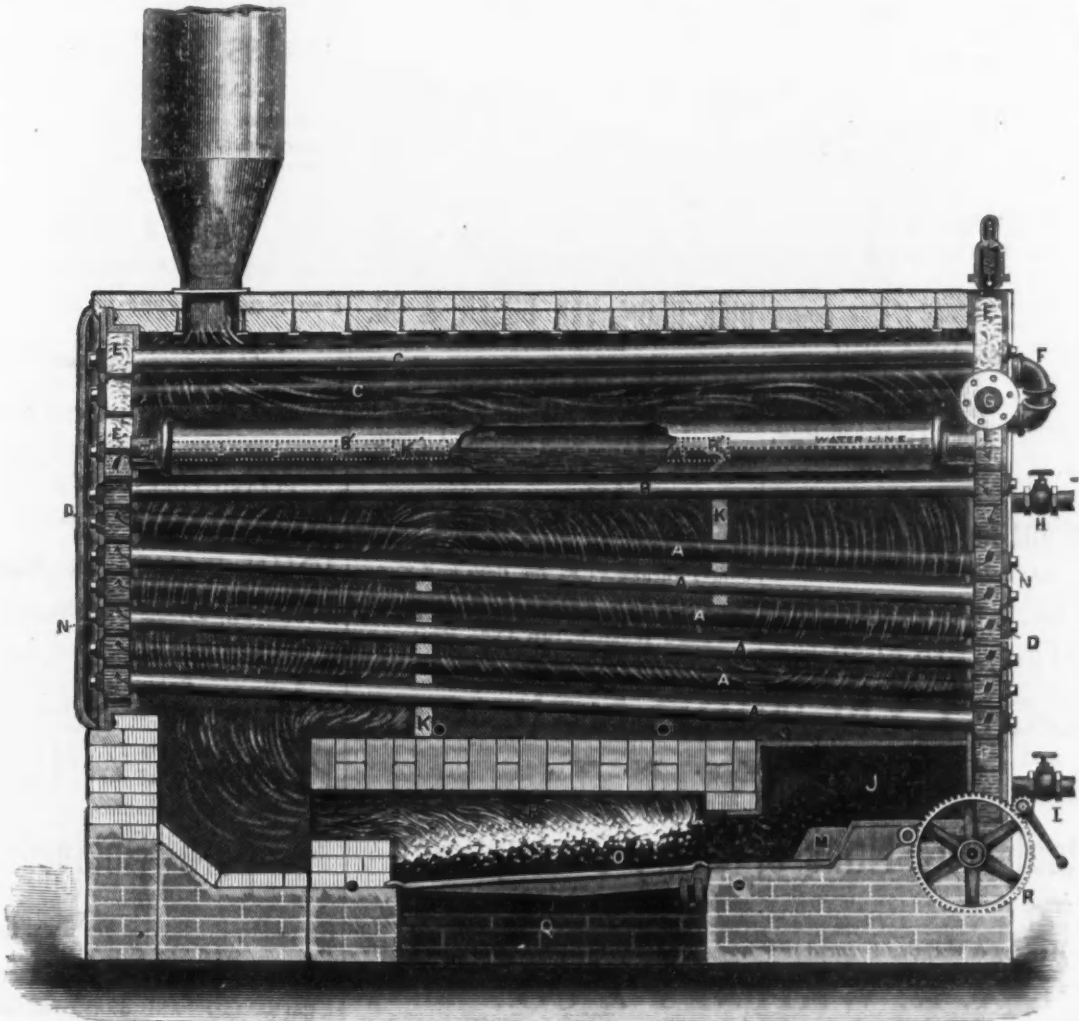


Fig. 2.—Longitudinal Section.

THE AUTOMATIC BOILER, BUILT BY THE CHICAGO AUTOMATIC BOILER COMPANY, CHICAGO, ILL.

with cast-iron reducers, and short tubes which are expanded into the water-heads. Located in this chamber is the float, which is provided with an opening in its upper side for the inlet of steam, and with a cock to be operated from the outside of the walls. Should water, by any means, accumulate in the float, by simply opening the cock it will be blown out. However, an accumulation of water in the device is practically impossible, the steam pressure inside and out being equal, and any water that might pass in would soon evaporate. The float is provided with a counterbalance that admits one-half its area being submerged. With so great a displacement, the float acts promptly on a duplex pump, thus giving a constant supply and keeping the water at the same level month in and month out. The float extends from one end of the float-chamber to the other, the center of the chamber being the water line. As the return flow of water to tubes A is partly through this float-chamber, the float is agitated all along the boiler, and not simply at one point where the water may be agitated more or less than at another.

The rear water-head is connected to the steam-head A' by means of the pipe F. Each water-head is made to rest on the brick walls, which form their support, thus dispensing with expensive truss work. The rear water-head and the steam-head rest on friction rolls, which admit of expansion and contraction of the tubes, and prevents any strain of the brickwork. For burning soft coal, each boiler, when desired, is constructed with a special furnace and stoker, as shown in Fig. 2.

The water is fed to the boiler through the feed-pipe H, and then circulates through the tubes A, rising in the tubes, as the water becomes hot, to the front water-head. As steam is generated, it is liberated at each

back into the tubes. The builders direct special attention to this feature of providing what is practically a mud drum, below the line of circulation, and which is not also the water-feed point, as in many other boilers.

One very important feature in the Automatic boiler is the use of a vibrating grate furnace, by which a constant and even supply of air is given for combustion. All grates are operated at once, at the will of the fireman, from the outside, by means of a lever. The bars having a trough-like top hold ashes sufficient to act as a complete non-conductor, preventing the grates from burning out, or even springing. The duplex steam pump is used exclusively with all Automatic boilers. The boiler is made practically without riveted joints or seams, has no shell, and is pronounced non-explosive. Instead of iron plate $\frac{1}{2}$ to $\frac{3}{4}$ inch thick, as in shell boilers, tubes only $\frac{1}{4}$ -inch thick are used, through which the heat passes much more quickly, and steam is generated correspondingly faster.

In Fig. 1, which represents a front view, A' is the steam-head; R, the wheel for working the stoker, and E' denotes the point at the bridge (not shown) over which the steam passes to G. In Fig. 2, the letters A A A designate the tubes through which water flows to the front head; B, the tubes through which water returns to the rear head; B', the automatic float-chamber; C, superheating or steam-drying tubes; D, water spaces, front and rear; E, steam spaces, front and rear; F, pipe connecting rear water-head and steam-head A'; G, steam outlet; H, water feed pipe; I, blow-off cock; J, fuel magazine; K, heat-deflecting walls; L, finger of stoker; N, plugs in outer sheet, opposite flues; O, vibrating

point where it is used, and as the pumping pressure on the principles above expressed must be double this, the circulating pump would require to work against a pressure of 330 pounds to compete with steam, and 10.2 times as much water must be pumped with the water plant as would be required by the steam plant; also the water for the water plant must be pumped twice—once at the high pressure of 330 pounds to circulate it in the pipes, and again at 235 pounds to pump it into the boiler, whereas with the steam plant one-tenth of the quantity of water would be pumped and but once—viz., into the boiler. It may, however, be claimed that the steam plant must be charged with the power required to return the water of condensation. The water is returned in practice by the pressure in the heating systems or by steam operating pumps, or pump traps which exhaust into the heating systems, so that no heat is wasted, and the losses are too inconsiderable to mention in comparison with the handicaps of the water system.

The hot water circulated has been called "superheated water," because it is hotter than 212°, but, of course, water cannot be superheated in the scientific sense that its temperature exceeds that due to its pressure. Steam may be superheated and must always have as high a temperature as that due to its pressure. Water cannot be superheated, but it may, of course, have a pressure greater than is due to its temperature—in other words, be sub-heated, which is the condition that the so-called superheated water would be in when maintained at constant pressure the moment it imparted any heat to another object. Reference must be finally had to

*Paper presented at the Washington meeting of the American Society of Mechanical Engineers, May 31-June 5, 1887.

required for generating the steam used in the engines that it will be enormously more than sufficient to condense all the steam worked through the engines, the condensed steam and the water condensing it will be wholly pumped back into the boiler, and there will be no rejected heat as in the case of other steam-engines, which rejected heat averages about eleven-twelfths of the total heat of the vaporization of water. If the cost of the indicated horsepower in the best engines be taken at about 2½ pounds of ordinary coal per hour, that cost, with the engines of a hot water system, will be only $\frac{1}{10}$ of a pound of coal per hour. The steam taken from the boilers at a temperature of 400° F. (pressure 250 pounds per square inch above zero) for working the engines, will be condensed by the water of the return pipe at the temperature of, say 160° F., and both the water of condensation and the condensing water will be pumped into the boiler, so that the total quantity of water in the boiler and in the hot-water pipe and in the return-water pipe will always remain constant."

With all the hot water used for power purposes rejected at a temperature of 316° and that for cooking at 390° or upward, how is the very large quantity of heat still remaining in the water to be reduced to the temperature of 160°, as stated in the above extract? It may be said it will be used for heating water, boiling articles of food, heating buildings, and such like uses. But what can be done with it in summer when there is no heating to do, and even in winter or at any other time—in fact, how is the surplus heat in the hot water from cooking and power apparatus to be exactly that required for some other culinary operation or for heating some particular building? The slightest calculation will show that the sur-

worse were it allowed to expand down to atmospheric pressure, for then a large portion would fly into steam and the return pipes be filled with a mixture of steam and water.

If the hot water were used to generate steam for power, the surplus heat would be so great that it would be impracticable to dispose of it in the same or adjacent buildings, even during the heating season. Few factories can use all the exhaust steam from their engines, whereas with the water system there would be about five times as much heat in the rejected water as would be used in the engine. If part of the latter be used for heating, the heat in the exhaust steam must be absolutely wasted. In fact, at all times a very large quantity of hot water must be rejected at the temperature of 316° due to the pressure, and, as in the case of cooking, the only economical way would be to return it to the station at a pressure of 70 pounds. If it were permitted to expand down to the pressure of the atmosphere, there would be 2.89 cubic feet of steam per pound of water circulated, or 29.4 cubic feet of steam at atmospheric pressure in the returns for each pound of water evaporated into steam for use in the engines, and the volume of steam in the return pipes would be about 60 times as large as that of the water contained in the same. Of course in a small plant for exhibition purposes radiators may be arranged to keep down the temperature rejected from cooking and power systems, but a slight study of the problem will, as above indicated, show that the demands for different purposes cannot be adjusted, even in winter, so as to prevent the rejection of a great deal of heat, and that in summer the heat

(Concluded on page 9.)

ANSONIA BRASS AND COPPER CO.,
MANUFACTURERS OF
PURE COPPER WIRE,
For Electrical Purposes,
Bare and Covered
O'NEIL'S PATENT PLANISHED
COPPER:
Seamless Brass and
Copper Tubing,
Sheet, B.R.s. Rods,
Wire, O'Neil's
Patent Nickel-
Plated
Copper, &c.,
IN
NEW YORK.

W. E. DODGE, Pres't.
G. P. COWLES, V.-P. and Treas.
A. A. COWLES, Secretary.

Ansonia Refined Ingot
Copper, Anchor Brand;
LAKE INGOT COPPER.

19 & 21 CHURCH Street,
NEW YORK.

PHELPS, DODGE & CO.,
IMPORTERS OF
TIN PLATE
Roofing Plate, Sheet Iron, Copper,
Pig Tin, Wire, Zinc, &c.

MANUFACTURERS OF
COPPER AND BRASS.
CLIFF STREET, NEW YORK.

(Established 1842.)
SCOVILL MFG. COMPANY
WATERBURY, CONN.,
Manufacturers of
BRASS—Sheet Brass, Brass Wire, Brass Tubing.
GERMAN SILVER—Sheet German Silver, German Silver
Wire, German Silver Tubing.
BUTT HINGES—Narrow, Middle, Broad, Desk, Ship,
Stop, Spring and Piano-Forc.
BUTTONS—Military, Naval, Livestock, Society, Rail-
road, School, Lasting, Silk and Dress.
LAMP GOODS—German Student Lamps, Kerosene
Burners, Kerosene Lamps.
PHOTOGRAPHIC—Camera Boxes, Printing Frames,
Chemicals, Paper, Glass, &c.
Scovill's Patent Lock Box for Post Offices.

DEPOTS:
125 Broome Street, New York.
177 Devonshire Street, Boston.
125 Lake Street, Chicago.

The Tyler Tube Mill,
MANUFACTURERS OF
Best Lap Welded Boiler Tubes and Pipe.
Works, BOSTON, MASS.

Christiana Rolling Mill Co.,
MANUFACTURERS OF
Boiler Plate and Tank Iron,
8 Oliver St., Boston. **Tyler Bro's** 12 & 14 CHURCH ST.
New York.

BROOKLYN WIRE NAIL CO.,
BROOKLYN, N. Y.,
MANUFACTURERS OF
Steel Wire Nails of Every Description.

AGENTS:
Dunham, Carrigan & Co., San Francisco. A. Baldwin & Co., New Orleans.
Leeds, Robinson & Co., Boston. F. S. Bradley & Co., New Haven.

A. R. WHITNEY & CO.,
17 BROADWAY, NEW YORK.

Iowa Barb Wire Co., 98 Reade Street,
New York.

UPSON, WALTON & CO.,
Cleveland, Ohio,
Manufacturers Agents for
Best Makes English and American
WIRE ROPE.
Prompt Shipments from Stock.
Quality Unexcelled. Write for Prices.

KORTING CONDENSER FOR SALE,
IN GOOD CONDITION,
Size No. 12, Price, \$75.00.
WATERBURY MANUFACTURING COMPANY,
WATERBURY, CONN.

THE WIRE GOODS CO.,
WORCESTER, MASS.
All kinds of Bright and Brass Wire Goods, Mill Wire Goods, Hand
Rail Screws, Cup Hooks, Cary Wardrobe Hooks, Staples, Meat Hooks,
Clothes Line Wire, Hooks and Rings, Towel Racks and Splasher
Holders. Wire Nails in all sizes and varieties. Wires cut, bent,
milled, headed, pointed, threaded, and made to any desired shape.
Special articles made to order.

A. W. PARMELEE, Pres't. **THE WIRE GOODS CO.,** WORCESTER, MASS.

Waterbury Brass Co.
ESTABLISHED 1845.
Sheet, Roll and Platers' Brass,
German Silver, Copper, Brass and
German Silver Wire, Brass and
Copper Tubing,
Copper Rivets and Burs,
Brass Kettles, Door Rail, Brass Tags, Per-
cussion Caps, Powder Flasks, Metallic
Eyelets, Shot Pouches, Tape Meas-
ures, &c., and small Brass Wares
of every description.
**Cartridge Metal in Sheets or
Shells a Specialty.**
Sole Agents for the CAPEWELL MFG. CO.'S
Line of Sporting Goods.

DEPOTS: 296 Broadway, New York. MILLS AT WATERBURY, CONN.
125 Eddy St., Providence, R. I.

**THE
New Haven Copper Co.,**
SOLE MAKERS OF
POLISHED COPPER
Under Patent of T. James, Sept. 12, 1876.
ALSO MANUFACTURERS AND
DEALERS IN
BRAZIERS & SHEATHING COPPER,
Kettles, Bottoms, Bolts, Circles, &c.
ALSO MANUFACTURERS OF
Cast Steel Angers and Bits of Superior Quality.
294 Pearl St., NEW YORK.

DICKERSON, VAN DUSEN & CO.
IMPORTERS OF
**TIN PLATE, PIG TIN, SHEET IRON,
COPPER, WIRE, ZINC, ETC.,**
29 and 31 Cliff St., cor. Fulton,
DICKERSON & CO., Liverpool. NEW YORK.

WASHERS
AND
Cold-Punched NUTS for Cars and Un-
finished Work.
MASON IRON COMPANY,
2426 Washington Ave., Phila.
M. H. LEONARD, TREASURER.

THE PLUME & ATWOOD MFG. CO.
MANUFACTURERS OF
**Sheet and Roll Brass
AND
WIRE,**

GERMAN SILVER AND GILDING METAL,
COPPER RIVETS AND BURS, COPPER
ELECTRICAL WIRE.
**Pins, Brass Butt Hinges, Jack
Chain Kerosene Burners,
Lamp Trimmings, &c.**
18 MURRAY ST., NEW YORK,
71 PEARL ST., BOSTON,
115 LAKE ST., CHICAGO.

Rolling Mill. Factories.
THOMASTON, CONN. | WATERBURY, CONN.
BRIDGEPORT BRASS CO.
MANUFACTURERS OF
Sheet and Roll Brass,

BRASS AND COPPER WIRE AND TUBING,
SEAMLESS AND BRAZED TUBING, COPPER
AND IRON RIVETS,
Officers and Caspadores, Lanterns and Trimmings,
Clocks and Fly Fan Movements, Lamps and
Trimmings, Kerosene Burners,
Plumbers' Materials.
Particular attention paid to cutting out Blanks
and manufacturing Metal Goods.
MANUFACTORY, Bridgeport, Conn. | WAREHOUSE,
19 Murray St., N. Y.

Holmes, Booth & Haydens,
WATERBURY CONN.
NEW YORK, BOSTON,
25 Park Place. 15 Federal St.
22 Murray St.
Manufacturers of all kinds of
Brass, Copper & German Silver
ROLLED AND IN SHEETS.
**Brass and Copper Wire, Tubing,
Copper Rivets and Burs.**
BRASS AND IRON
JACK CHAIN, DOOR RAIL.
GERMAN SILVER SPOONS, SILVER-
PLATED FORKS AND SPOONS,
KEROSENE BURNERS, &c.

JOHN DAVOL & SONS,
AGENTS FOR
Brooklyn Brass & Copper Co.,
DEALERS IN
Ingot Copper, Spelter, Lead, Tin,
Antimony, Solder & Old Metals,
100 John Street, New York.

PASSAIC ZINC CO.
MANUFACTURERS OF
Pure Spelter
FOR
Cartridge Brass, Gas Fixtures, Bronzes
AND ALL FINE WORK.
Also for
GALVANIZERS AND BRASS FOUNDERS.

MANNING & SQUIER, Gen'l Agents,
111 LIBERTY ST. (2d Floor), NEW YORK.
GEO. W. PRENTISS & CO.,
HOLYOKE, MASS.,
Manufacturers of

IRON WIRE,
Bright, Coppered, Annealed and Tin Plated. Also
GUN SCREW WIRE
Of all sizes, straightened and cut to order.

OLD COLONY RIVET CO.
KINGSTON, MASS.
TINNERS AND ALL OTHER
NORWAY IRON
7/16 IN DIAM. & SMALLER.
ALL LENGTHS & STYLES.

Established 1830.
THE PLYMOUTH MILLS.
Rivets, Trunk Nails
Tacks, Clout Nails,
Burs, Wire Nails
PLYMOUTH, MASS.

WASHBURN & MOEN MANUF'G CO.,
Worcester, Mass., New York City, Chicago.
EVERY VARIETY OF **WIRE** FOR ALL PURPOSES.

Hard and Soft Drawn Copper Wire for Electrical Purposes; Galvanized
Iron and Steel Telegraph and Telephone Wire; Glidden Patent Steel
Barb Wire; Watch and Clock Main Springs; Eyeglass Springs; Steel
Wire for Needles and Drills; Patent Steel Wire Bale Ties;
Pump Chain; Two Strand Twisted and Flat Twisted Fence
Wire, without Barbs; Fence Staples, Stretchers, &c.; Bright,
Annealed, Tinned, and Galvanized and Copper Wire,
on Spools 1 oz. to 1 lb.

WIRE ROPE AND CABLE.

Galvanized Iron Wire Rope for Ships' Rigging, &c. Galvanized Steel Wire Cables for
Suspension Bridges, Transmission and Standing Ropes, Hoisting Ropes, Tiller Ropes,
Switch Ropes, Copper, Iron and Tinned Sash Cord, Phosphor-Bronze and Copper Wire
Rope, Wire Clothes Lines, Picture Cord, Galvanized Wire Seizing, and all the Fixtures
and Appliances required for use with the foregoing.
SEND FOR PRICE LISTS, CIRCULARS AND DESCRIPTIVE PAMPHLETS.

NEW YORK WAREHOUSE: 16 Cliff Street. CHICAGO WAREHOUSE: 107 & 109 Lake Street.

WIRE WORK IN EVERY FORM AND VARIETY.
HOWARD & MOORE
EVERYTHING IN WIRE
COPPER
IRON
STEEL
WIRE CLOTH
WIRE ROPE
WIRE NETTING
WIRE MESH
WIRE FENCE
WIRE GUARD
WIRE RAILING
WIRE STAIRCASE
WIRE BALCONY
WIRE GARDEN
WIRE CLOTH
WIRE NETTING
WIRE MESH
WIRE FENCE
WIRE GUARD
WIRE RAILING
WIRE STAIRCASE
WIRE BALCONY
WIRE GARDEN

ABRAHAM S. HEWITT, President. THE JAMES HALL, Treasurer.
WM. HEWITT, Vice-President. E. HANSON, Secretary.
TRENTON IRON COMPANY
(INCORPORATED 1847).
MAKERS OF IRON AND STEEL

WIRE
OF ALL GRADES.
Bright, Annealed, Coppered, Tinned and Galvanized Iron and Steel Wire Rods.
Extra Qualities of Bar Iron and Rods. Best Qualities of Gun-Screw and
Charcoal Iron Wire, Crucible, Siemens-Martin and Bessemer Steel
Wire. Wire Straightened and Cut to Lengths.
Works and Office, TRENTON, NEW JERSEY.
New York Office, COOPER, HEWITT & CO., 17 Baring Slip.
Philadelphia Office, 22 & 24 North Fourth Street

WIRE ROPE
HAZARD MFG CO.
WAREHOUSES: 87 Liberty St., New York. WORKS: Wilkesbarre, Pa.

BRODERICK & BASCOM
WIRE ROPE
BRODERICK & BASCOM ROPE CO.
ROPE CO., ST. LOUIS, MO.

A. LESCHEN & SONS ROPE CO.,
Manufacturers of
WIRE ROPE
963 and 965 N. MAIN STREET, ST. LOUIS, MO. Correspondence invited.

THE CELEBRATED
"SILVER FINISH"
GALVANIZED POULTRY NETTINGS.
FOR SALE BY THE HARDWARE TRADE. GET THE BEST.

O. LINDEMANN & CO.
MANUFACTURERS OF
Japanned, Brass, Tin
Plated and Wood.

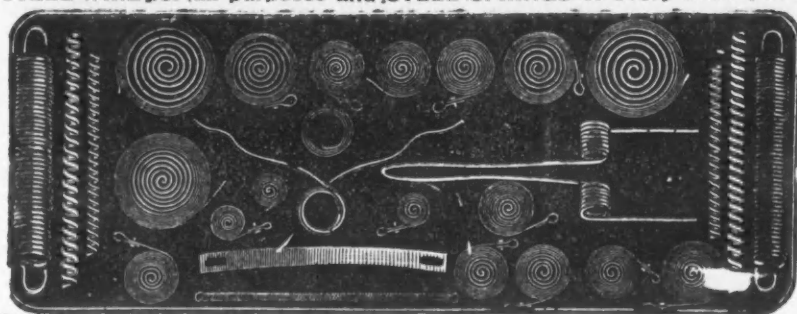
BIRD
CAGES.



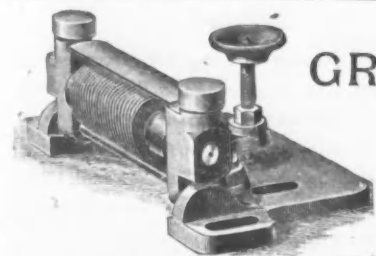
51 BEEKMAN STREET, - NEW YORK.

CARY & MOEN,

STEEL WIRE for all purposes and STEEL SPRINGS of every description.



Market Steel Wire, Crinoline Wire, Tempered and Covered.
Also PATENT TEMPERED STEEL FURNITURE SPRINGS, constantly on hand.
284, 286 and 288 West 29th Street, NEW YORK.



**Turner's Champion Improved
GRINDSTONE DRESSING MACHINE.**

The Best Machine in the Market for Truing the Faces of Grindstones.

Sizes, 4-inch, 6-inch, 8-inch, 10-inch, 12-inch,
Prices, \$7.50, \$10.00, \$12.00, \$14.00, \$16.00 each.

BLAKE & JOHNSON, Waterbury, Conn.

W. S. TYLER
WIRE WORKS CO.
SUCCESSORS TO W. S. TYLER,
MANUFACTURERS OF

Revolving Coal Screens,
Coal Yard Screens and Foundry Riddles.

Wire Cloth of Every Description Made and
Carried in Stock.
W. S. TYLER, Pres. E. H. ALLEN, Sec. & Treas.
CLEVELAND, OHIO.

**KELLY STEEL BARB
WIRE FENCING.**

YIELDING

BARB.



STRENGTH,
LIGHTNESS.

Don't Lacerate Stock.

Is just as effective, weight LIGHTER per rod, Barbs
are FINE STEEL. Does not cost much more than the
common, rigid wire barb - is worth double.
We make galvanized and painted. Our Kelly Paint
will LAST LONGER than galvanizing.
This Style of Wire is sold through agents only.
HARDWARE MERCHANTS being preferred. It is the
only safe barb for horses.
Country Merchants will find it to their advantage
in securing the agency on a class of goods that is in
demand and that has no competitor of its kind. We
also make both Two and Four-Point Wire Barbs.

ADDRESS

**THORN WIRE HEDGE CO.,
CHICAGO.**

WIRE
TINNED,
MATTRESS,
BROOM,
LANTERN,
Steel Spring,
MARKET,
TACK,
STAPLE.

All Sizes
Straightened
AND CUT
TO ORDER.
CORRESPONDENCE
SOLICITED

**Palmer Wire Mfg. Co
PALMER, MASS.**



E. T. BARNUM,
MANUFACTURER OF
Creting, Iron Fences; Window
Guards, Office Railing, Balcony Fire
Escapes, Weather Vanes, Hay Racks,
Oat Manges, Poultry Netting, Jail
Cells, &c.
Detroit, Mich.

**Rome Brass and Copper Mills,
ROME, N. Y.,**

— MANUFACTURERS OF —

Roll and Sheet Brass and German Silver
Brass, Copper and German Silver Wire;
Brass and Copper Rods and Braised Brass Tubing;
Rivets and Burs;
Seamless Brass Ferrules
Check and Key Tags;
Brazers and Sheathing Copper
Copper Bottoms;
Bolts, Circles, &c., &c.

The "Queen City" Ex-
tension Window Screen
and the Original Patent Window and
Door Screen Corners, made by the
Porter Mfg. Co., Bur-
lington, Vt., are not to be con-
founded with inferior imitations bearing a
similar name. Send for our price list.

HARROW TOOTH STEEL,
tough, strong and hard. Wears well
in the ground. In multiple bars or
sheared to lengths.

Also **POINTED HARROW
TEETH**, round, square, diamond
or oval.

Low prices on large lots.

Address **GAUTIER STEEL
DEPT. of Cambria Iron Co., JOHNS-
TOWN, PA.**

New York Office,
104 READE ST.

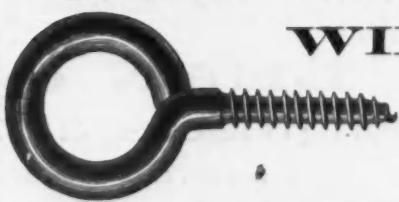
Chicago Office,
12 MONTAUK BLOCK.
[No. 194.]

Philadelphia Office,
523 ARCH ST.



Estab'd 1818. Incorp'd 1874.
**THE
GILBERT & BENNETT MFG. CO.**
WAREHOUSES:
42 CHIT St., New York.
228 Lake St., Chicago, Ill.
MANUFACTURERS OF
Iron & Galvanized Wire
Sieves and Wire Cloth.
Power Loom Painted and Gal-
vanized Window Screen Wire
Cloth, Galvanized Wire Cloth
for Drying Fruits, World's Gal-
vanized Web Wire Fence, Gal-
vanized Twist Wire Poultry
Netting.
Factories, Georgetown, Conn.

**BRIGHT IRON AND BRASS
WIRE GOODS.**



(Established 1848.)

M. S. BROOKS, Chester, Conn.

Also Bright Wire Goods for Cotton and
Woolen Mills. Wire straightened, cut, milled
and bent into any shape, with or without
thread. Write for Catalogue and Prices.

PHOSPHOR-BRONZE



TRADE

MARKS:

For Bearings, Slide Valves, Cylin-
der Rings, Cross-Head Gibs, Steps,
Bushings, and all purposes where
Maximum Durability, Anti-Frictional
and Non-Cutting Qualities are desir-
able. Pump Rods, Bolts and Nuts.
Machine and Wood Screws, &c., &c.
Combine Toughness, Strength, Dura-
bility and Resistance to Corrosion.
Castings of all kinds to order. Send
for pamphlet and prices.

THE PHOSPHOR-BRONZE SMELTING CO., LTD.,

No. 512 Arch Street, PHILADELPHIA, PA.

Owners of the U. S. Phosphor-Bronze Patents. Sole Manufacturers of Phosphor-Bronze in the U. S.

WICKWIRE BROTHERS, CORTLAND, N. Y.,

MANUFACTURERS OF

WIRE CLOTH AND WIRE GOODS

"CORTLAND"
**WINDOW
SCREEN**
WIRE CLOTH.



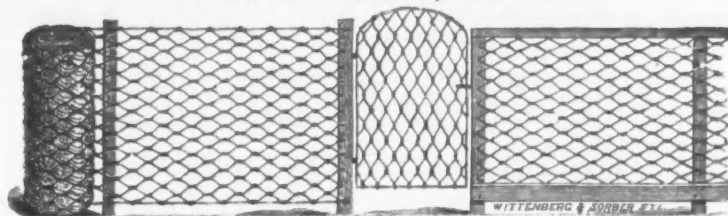
Metallic Coal Sieve.

Dish Covers,
Corn Poppers,
Coal Sieves,
Flour Sieves
Etc., Etc.

**MIL TEMPERED
JORGAN SPRING CO.**
WORCESTER,
MASS.

LUDLOW-SAYLOR WIRE CO.,

ST. LOUIS, MO.



WIRE, WIRE CLOTH, WIRE ROPE.

Counter Railings, Window Guards, Iron and Wire Fences,
Plain and Barbed Fencing Wire.

THOMPSON McCOSH, President.

JOHN A. McCOSH, Sec. and Treas.

HAWK EYE
STEEL
FENCE
PATENTED
BURLINGTON, IOWA
BARB
WIRE
LICENSED
LIGHTEST, STRONGEST, BEST BARB WIRE IN EXISTENCE.

The above cut represents Preston's Patent Braided Cable Wire Fence Rail, manufactured by the
HOLLOW CABLE MFG. CO., Hornellsville, N. Y. We also manufacture extensively
four different sizes Wire Cloth Lines and a three-ply Braided Wire Web for Box Bands.
Send for Circulars and Price Lists.
F. L. HONORE 48 & 50 Lake St. Chicago Ill.

PENNSYLVANIA WIRE WORKS,

231 and 233 ARCH ST., PHILADELPHIA.

Factories: 113 and 115 Broad St.

Corn
Poppers,
Rat Traps,
Mouse Traps,
Barrel Covers,
Clothes Lines,
Steel Wire Brushes,
Wire Hanging Baskets,
Horse and Ox Muzzles,
Mosquito Wire Cloth
Adjustable Window Screens.

Edward Darby & Sons

MANUFACTURERS OF

**WIRE CLOTH,
SIEVES, RIDDLES,
SCREENS,
BIRD CAGES.**

**WIRE GOODS AND WIRE WORK
OF EVERY DESCRIPTION.**

Brass, Copper and Iron
Wire Cloth,
Brass Milk Strainer
Wire Cloth,
Cheese Sifters,
Dog Muzzles,
Dish Covers,
Fly Traps,
Egg Beaters,
Oyster
Broilers.

CLINTON WIRE CLOTH CO.,

MANUFACTURERS OF EVERY DESCRIPTION OF

**WIRE CLOTH, HEX. NETTINGS,
WIRE LATH AND FENCING.
Perforated Metals.**

GALVANIZERS AND TINNERS OF

WIRE CLOTH and NETTINGS.

Clinton "Standard" (Number 33 Wire)
Painted Window Screen Wire Cloth.

Factory and General Office—CLINTON, MASS.
NEW YORK, 59 Beekman St. BOSTON, 23 Court St. CHICAGO, 137 Lake St.

THE NEWARK, O., WIRE CLOTH CO.,

— MANUFACTURERS OF —

Brass and Copper Wire Cloth,

ALSO BRASS AND COPPER WIRE.

Brass Strainer Cloth a Specialty.
NEWARK, OHIO.

The American Garment Hanger.

PERKINS & BRADLEY M'FG CO.

New Haven, Conn.

P. O. Box 1404 A.

SOLE MANUFACTURERS OF

THE AMERICAN GARMENT HANGER,
THE INDESTRUCTIBLE TOWEL ROLL,
THE INDESTRUCTIBLE CEILING HOOK,
THE INDESTRUCTIBLE COAT AND HAT HOOK



PATENTED,
MARCH 7th, 1882.

OGDEN & WALLACE, Iron and Steel

Of every description kept in stock.
Agents for Park, Brother & Co.'s
BLACK DIAMOND STEEL.
All sizes of Cast and Machinery Steel constantly on hand.

PIERSON & CO.,

(ESTABLISHED 1790.)
IMPORTERS AND DEALERS IN
IRON and STEEL,
And GENERAL COMMISSION MERCHANTS,
24, 25, 26 & 27 West Street, NEW YORK.

ABEEL BROTHERS,

ESTABLISHED 1795
Iron * Merchants,
190 SOUTH ST., NEW YORK.
365 WATER ST., NEW YORK.

"CATASAUQUA" IRON.

Large Assortment of Extra Heavy Sizes on Hand.
"ARM CO." SHAFING.
Also general assortment of Norway, Ulster and Refined Bar, Band, Hoop, Scroll Angle Iron; Steel of all kinds, &c.

A. R. WHITNEY & CO.,

MANUFACTURERS OF AND DEALERS IN
Iron and Steel

AGENCIES:

PORTAGE IRON CO., Limited, Merchant Iron and Soft Steel and Cut Nails and Spikes.
PARK BRO. & CO., Limited, Steel Plates.
GLASGOW TUBE WORKS, Boiler Flues.
A. M. BYERS & CO., Wrought Iron Pipe.
CARNegie Bros. & Co., Limited, Iron and Steel Beams, Channels, Shapes and Shafting.
BROOKLYN WIRE NAIL CO., Steel Wire Nails.
THE CHESTER PIPE AND TUBE CO.
Plans and estimates furnished and contracts made for erecting Iron Structures of every description. Books containing cuts of all iron made sent on application by mail. Sample pieces at office. Please address 17 Broadway, New York.
P. O. BOX 33.

Borden & Lovell,

70 & 71 WEST ST.,
L. N. LOVELL,
C. A. GREENE,
H. L. FREELAND,
New York.
Agents for the sale of
FALL RIVER IRON WORKS CO.'S
Nails, Bands, Hoops and Rods.
DANVILLE NAIL & MFG. CO.'S
NAILS AND SPIKES.
BORDEN MINING CO.'S
CUMBERLAND COAL.

JOHN FOX,

Cast Iron Gas and Water Pipe.
2 to 48 Inches Diameter,
160 BROADWAY, NEW YORK.

DANIEL F. COONEY,

88 Washington St., New York,
IRON AND STEEL BOILER PLATES.
GLASGOW IRON CO. PINE IRON WORKS.
ALLISON BOILER FLUES.

HICKS & DICKEY, 413 Commerce St., Phila., Pa.

Iron, Steel and Forgings of every Description.
Machinery Steel in Bars, also cut to exact lengths. Crown Cast Tool Steel, Warranted. Special Quality Iron and Steel Shafting, with large assortment of heavy sizes on hand. Plate and Sheet Iron, Bolts, Nuts and Rivets. Hartman Steel Wire Nails. Steel and Iron Forgings of all kinds. Cold Rolled Steel Shafting.



PASSAIC ROLLING MILL CO.
Manufacture and have always in stock
ROLLED IRON BEAMS,
Channels, Angles, Tees, Merchant Bars, Riveted Work, Forgings, Eye Bars, &c.,
PATERSON N. J.
Rooms 151 and 152, No. 45 Broadway, New York.

CUT NAILS,

Hot Pressed Nuts, Bolts, Washers, &c.

DOVER IRON CO.'S

Boiler Rivets, Boiler Brace Jaws, Socket Bolts,
BAR IRON.

FULLER BROTHERS & CO.,

139 GREENWICH ST., NEW YORK.

The American Metal Co.

(LIMITED),
43 Exchange Place, New York.
P. O. BOX 957.
COPPER, MATTES AND COPPER ORES, IRON,
IRON ORES, MANGANESE ORES.
TIN, LEAD, SELLER, ANTIMONY, NICKEL, BULLION.
Advances made on Consignments.

AGENTS FOR
Henry R. Merton & Co., - - London.
Metallgesellschaft, Frankfort-on-Main.

B. F. JUDSON,

Importer of and Dealer in
SCOTCH AND AMERICAN
Pig Iron
WROUGHT & CAST SCRAP IRON,
OLD METALS.
457 & 459 Water St., NEW YORK.
233 & 235 South St., NEW YORK.

PHOENIX HORSE SHOES.

PHOENIX HORSE SHOE CO.
POUGHKEEPSIE, N. Y.

New York Office, 20 Reade Street.

Chas. Kimrod & Co.,

PIG IRON.
Chicago and Detroit.

JAMES WILLIAMSON & CO.,

SCOTCH AND AMERICAN
PIG IRON,
No. 63 Wall St., New York.

HENDERSON BROS.,

MACHINISTS,
WATERBURY, CONN.,
Manufacturers of
EXHAUST TUMBLING BARRELS.
(Illustrated Catalogue sent on application.)



BOLT & RIVET CLIPPERS.

For cutting off the ends of Bolts and Rivets, on carriages, wagons, harness, &c. Ask for them where you buy your hardware, or send for circular and price list.
CHAMBERS, BROTHER & CO.,
52nd St., Below Lancaster Ave.,
PHILADELPHIA, PA.

OXFORD

IRON AND NAIL CO.,
Cut Nails
AND
SPIKES.

J. S. SCRANTON, Sales Agent,
81, 83 and 85 Washington Street,
NEW YORK.

BURDEN'S HORSE SHOES.

"Burden Best"
Iron
Boiler Rivets.

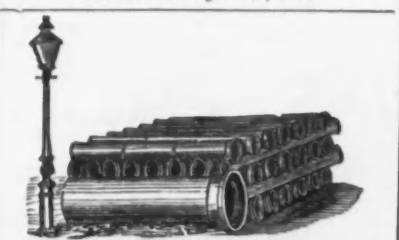
THE BURDEN IRON CO.

TROY, N. Y.
WILLIAM H. WALLACE & CO.,
Iron Merchants,
COR. ALBANY & WASHINGTON STS.,
NEW YORK CITY.

Wm. H. Wallace. Wm. Bispham. E. C. Wallace.

DONALDSON IRON COMPANY

MANUFACTURERS OF
CAST IRON GAS & WATER PIPE
CAST IRON PIPE
And Special Castings for Water and Gas. Also, Flange Pipe
Emaus' Lehigh Co., Pa.



R. D. WOOD & CO.,

PHILADELPHIA
Manufacturers of
Cast Iron Pipe
FOR WATER AND GAS.

LAMP POSTS, VALVES, ETC.

Mathew's Pat. Anti-Freezing Hydrants.
400 CHESTNUT STREET.
John H. Ricketson, Pres. Wm. Holmes, Treas.
A. G. Barnett, Sec'y.

A. GARRISON FOUNDRY CO.,

Manufacturers of Sand, Patent Homogeneous,
Steel and

Chilled Rolls.

Ore and Clay Pulverisers, Rotary Squeezers,
Haskin's Patent Double Spiral Finions, and Rolling
Mill Castings of every description.
Office, Nos. 10 & 12 WOOD ST., PITTSBURGH, PA.

CHAS. J. STEBBINS,

104 Reade St., New York,
STEEL AND IRON NAILS.

Bonnell, Botsford & Co.,

IRON, NAILS AND SPIKES
YOUNGSTOWN, OHIO.

CONDIT, FULLER & CO.,

PIG IRON BAR
Cleveland, Ohio.

W. D. WOOD & CO., L'd,

PITTSBURGH, PA.



Planished Sheet Iron.

Patented April 8th, 1873; Sept. 6th, 1873; Oct. 6th, 1874; Jan. 11, 1876; Oct. 17th, 1876; Jan. 15th, 1877; Feb. 6th, 1877; Dec. 10th, 1878; Jan. 10th, 1882; Jan. 1st, 1884; Feb. 12th, 1884; March 4th, 1884; Jan. 6th, 1885.

Guaranteed fully equal in all respects to the

IMPORTED RUSSIA IRON,
and at a less price.

ALSO
Common, Refined Charcoal and Juniate

GRADES OF

BLACK SHEET IRON.

Smooth on both sides.

W. J. HAMMOND & SONS,
LIMITED
PITTSBURGH, PA.

Sheet Steel

For Roofing and Corrugating.

OPEN-HEARTH STEEL, INGOTS and BILLETS.
SHEET IRON, All Grades.

Manhattan Rolling Mill.

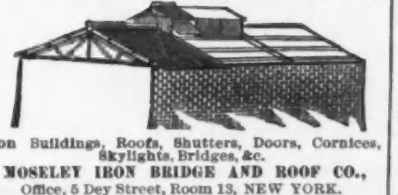
J. LEONARD,

445 to 451 West St., NEW YORK
177 & 179 Bank St., NEW YORK

HORSE SHOE IRON,

The Calk Steel, Rods, Ovals, Half Ovals and Flats.

Corrugated, Crimped and Clap-Board Iron Roofing & Siding



WM. MCFARLAND,

Iron and Brass Founder,

TRENTON, N. J.

Chilled Cast Wire Dies a Specialty.

Any size or style made at short notice.

HOWARD, CHILDS & CO.,

IRON AND STEEL FACTORS

AND COMMISSION MERCHANTS,

HAMILTON BUILDING, PITTSBURGH, PA.

Iron and Steel of all Descriptions. Iron and Steel Nails, Heavy Hardware, Wrought and Cast Iron Pipe. Railway and Mine Equipment and Supplies. Plain and Barbed Wire. Manufacturers' and Contractors' Supplies.

D. R. LEAN. T. S. BLAIR, JR.

LEAN & BLAIR,

Engineers and Contractors,

Room 709, Hamilton Building, Pittsburgh, Pa.,

will contract to erect, equip and place in operation Open-Hearth and Bessemer Steel Works, Blast Furnaces, Lash Steel Melting Furnaces, Hainsworth Soaking Pits, Fire-Brick Hot-Blast Stoves, Gas Works, &c.

THE ROBINSON-REA MFG. CO.,

PITTSBURGH, PA.

**PLATE,
OLD RAIL,
MUCK**

(No. 2.)

RHODE ISLAND HORSE SHOE CO.,

MANUFACTURERS OF

Horse, Mule & Snow Shoes OF THE Perkins Pattern.

Works at Valley Falls, R. I. Office, 31 Exchange Place, Providence, R. I.

F. W. CARPENTER, President. C. H. PERKINS, Gen'l Manager. R. W. COMSTOCK, Secretary

J. M. SCHOONMAKER COKE CO.

MANUFACTURER AND SHIPPER OF

CONNELLSVILLE

Capacity of Mines, 2500 Tons Daily.

Siding connections with all Lines of Railroads.

Office, 120 Water Street, PITTSBURGH, PA.

COKE

JAMES P. WITHEROW, Engineer & Contractor,

Lewis Block, PITTSBURGH, Pa.

GENERAL AGENT FOR

WHITWELL FIRE-BRICK STOVES

AND

CLAPP-GRIFFITHS PATENTS FOR MANUFACTURE

OF SOFT STEEL

specially adapted for A No. 1 Boiler Plates,

Boiler Rivets, Wire Rods, Stay Bolts,

Stamping Ware, Nail Plates, &c.

Will contract to completely erect, equip

and place in operation Blast Furnace Whit-

well Stoves and Steel Plants as above. As

I manufacture at our own works everything

appertaining to Blast Furnace and Steel

Works construction, can guarantee prompt-

ness and satisfaction.

SYRACUSE MALLEABLE IRON

WORKS,
SYRACUSE, - N. Y.

Mower and Reaper Castings and

Carriage Irons a Specialty.

W. B. BURNS, PROPRIETOR.

HENRY KELLY,

PUBLIC ACCOUNTANT,

923 Walnut St., PHILADELPHIA, Pa.

Specialty: Iron and Steel Manufacturers' Cost

Accounts and Partnership Settlements.

Late Chief Accountant to Cambria Iron Company

E. JENCKES MANFG. CO.,

PAWTUCKET, R. I.

Bright Wire Goods, Belt Hooks,

SPRING PINS, KEYS AND CUTTERS.

Bent Wire Goods of all kinds a Specialty.

New York Office, 88 Chambers Street.

SAMUEL A. HAINES, Selling Agent

Engineering Instruments and Supplies.

Safety Lamps

QUEEN & CO.,
Philadelphia, Pa.

WILLIAM R. HART & CO.,
SPANISH, AFRICAN **IRON ORES** AND ITALIAN

CASTLE PIG IRON.
For Finest Steel (phosphorus uniformly low, seldom reaching .03 per cent., and Silicon from 1 per cent. upward, according to requirements of buyers).
Bessemer, Basic and Open-Hearth Steel Slabs, Billets, Plates and Bars to specifications furnished.
Old Iron and Steel Rails, Crop Ends, Spiegeleisen, Ferromanganese, &c.

MOHICAN PIG IRON.
A superior iron for ordinary Bessemer work, comparing favorably with English West Coast Hematites.

226 Walnut Street, - PHILADELPHIA.
PITTSBURGH OFFICE, 84 FOURTH AVE.

Cambria Steel.
STEEL RAILS, STANDARD AND LIGHT WEIGHTS,
STREET RAILS AND
RAILWAY FASTENINGS,
Bessemer and Open-Hearth Blooms, Billets and Bars
Steel Axles, Steel Angles.
Steel Castings, Steel Forgings.
CAMBRIA IRON COMPANY,
Office, 218 S. Fourth St., Philadelphia. Works, Johnstown, Pa.

ALAN WOOD COMPANY,
MANUFACTURERS OF
Patent Planished, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom
PLATE & SHEET IRON,
ALSO LIGHT PLATES AND SHEETS OF STEEL,
No. 519 Arch Street, Philadelphia, Pa.
Orders solicited especially for Corrugated, Gasholder, Pan and Elbow, Water Pipe, Smoke Stack, Tank and Boat Iron; Last, Stamping, Ferrule Locomotive Headlight and Jacket Iron.

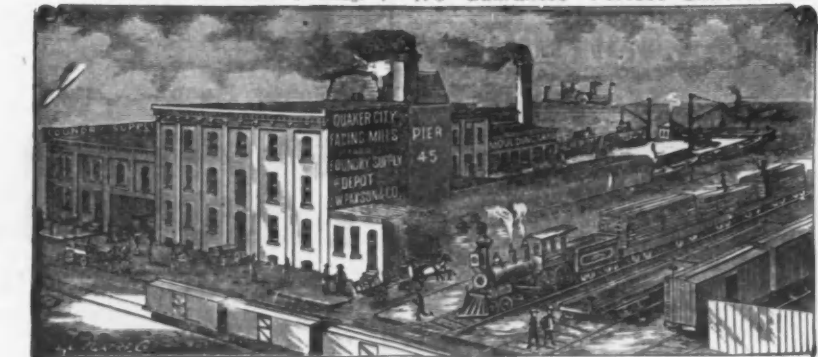
W. H. WALBAUM & CO.,
206 S. Fourth Street, Philadelphia.
NEW AND OLD RAILS, BLOOMS, BESSEMER PIG.
Crop Ends, Spiegeleisen, Iron Ores and Railroad Supplies Generally.
AGENTS IN THE UNITED STATES FOR
THE NORTH LONSDALE IRON & STEEL CO., Limited, Bessemer Pig Iron, brand "Ulverston,"
Malleable Pig Iron, brand "U. H. M."
MOSS BAY HEMATITE IRON & STEEL CO., Limited, Spiegeleisen, Crop Ends, &c.
Also for "Lorn" Malleable Charcoal Pig Iron and N. B. ALLEN & CO.'S Dinas Fire Bricks.

PENCOYD IRON WORKS,
A. & P. ROBERTS & CO.,
—MANUFACTURERS OF—
BEAMS, CHANNELS, DECK BEAMS, ANGLES, TEES,
PLATES, MERCHANT BAR.
Shafting and Rolled or Hammered Axles of Iron or Steel.
Mce, No. 265 S. Fourth St., Philadelphia. Agents for the sale of Glamorgan Pig Iron.

GORDON, STROBEL & LAUREAU, Limited,
Engineers and Constructors,
Main Office: No. 226 Walnut St., Philadelphia, Pa.
Works: Mifflin and Meadow Sts., Philadelphia, Pa.
Western Branch: PITTSBURGH, Pa. Southern Branch: NASHVILLE, TENN.
Gordon-Whitwell-Cowner Fire-Brick Hot-Blast Stoves.
We have contracted for the following Stoves, since their introduction one Year ago
Jefferson Iron Works, Ohio.....3 Stoves. North Chicago R. M. Co., Ill.....3 Stoves
Joliet Iron & Steel Co., Ill.....4 " Missouri Furnace Co., Mo.....2 "
Jupiter Furnace Co., Mo.....3 " Western Steel Co., Mo.....3 "
Teno, Coal, Iron & R. R. Co., Ala.....2 " Cleveland Roll Mill Co., Ohio.....4 "
Ala. & Tenn. Coal & Iron Co., Ala.....2 " Belmont Nail Co., W. Va.....2 "
Cokeburg Coal & Coke Co., Ala.....3 " Ala. & Tenn. Coal & Iron Co., Ala.....2 "
Nashville Charcoal Iron and Steel Co., Tenn.....4 " Decatur Land, I. & L. Co., Ala.....2 "
Princess Furnace, Va.....4 " N. Y. & Ferry Coal and Iron Co., Ohio.....2 "
Total.....60 stoves

BLAST FURNACES AND STEEL WORKS.

QUAKER CITY FACING MILLS.
For sample see (out) Store Plate Facing. We Guarantee Perfect Satisfaction.
For sample see A. A. Machinery Facing.



RIDDLES, SHOVELS, BELLOWS, STEEL WIRE BRUSHES, BRISTLE BRUSHES,
And all other Tools used in a Foundry, of our Own Special Make.
J. W. PAXSON & CO.,
DEALERS IN MOUNDING SAND, AND MANUFACTURERS OF FOUNDRY SUPPLIES,
Nos. 1015, 1017, 1019 and 1021, or Pier 45 North. Del. Ave., PHILADELPHIA, PA.

WAITE, VAN HARLINGEN & MACTIER,
ENGINEERS AND CONTRACTORS.
308 Walnut St., - Philadelphia, Pa
Metallurgical Furnaces:

SPECIALTY: GAS REGENERATIVE FURNACES OF THE SIEMENS TYPE.
Steel, Heating, Puddling, Tube Welding, Zinc and Chemical
Furnaces; also Glass Tank and Pot Furnaces.
Works Built Complete.



LOCOMOTIVE AND CAR-WHEEL TIRES
Manufactured from the celebrated OTIS STEEL BRAND
STANDARD
Quality and efficiency fully guaranteed. Prices as low as any of the same quality. We manufacture Heavy and Light Forgings, Driving and Car Axles, Crank Pins, Piston Rods, &c.
THE STANDARD STEEL WORKS,
WORKS AT LEWISTOWN, PA.
Office, 220 S. 4th St., Philadelphia, Pa.

POTTSVILLE IRON & STEEL CO.,
POTTSVILLE, PA., Manufacturers of all kinds of
STRUCTURAL STEEL AND IRON
Viz., Beams, Channels, Tees, Angles, Plates and Bars. Also Steel and Iron Axles for Freight and Passenger Cars.

This Steel is manufactured by the CLAPP-GRIFFITHS process, and is specially adapted, in addition to the above, for Boiler and Bridge Rivets, Wire Rods, Nail Plates, &c. Our Mild Steel is well adapted for use in place of the best quality of Wrought Iron, where a greater strength and ductility is required; it welds readily as Iron. Also Billets, Slabs of all sizes and any desired temper. Shafing of all sizes in stock, from which prompt shipments can be made.

Brewery, Malt and Ice House Construction a Specialty.

The Phoenix Iron Co.,
410 WALNUT ST. PHILADELPHIA
Manufacturers of Wrought Iron

Beams, Deck Beams, Channels, Angle & Tee Bars,
STRAIGHT AND CURVED TO TEMPLATE,
Largely used in the construction of Iron Vessels, Buildings and Bridges.

Wrought Iron Roof Trusses, Girders and Joists, and all kinds of Iron Framing used in the construction of Fire-Proof Buildings; Patent Wrought Iron Columns, Weldless Eye Bars, and Built-up Shapes for Iron Bridges.

REFINED BAR, SHAFING, and Every Variety of SHAPE IRON Made to order.
Plans and Specifications furnished. Address **DAVID REEVES, President.**
New York Agents, MILLIKEN, SMITH & CO., 61 Liberty St.
Boston Agents, HOUDLETTE & DUNNELS, 272 Franklin St.

The Allentown Rolling Mills,
MANUFACTURERS OF
Rails, Bars, Axles, Shafting, Fish Bars (Plain and Angle), Spikes, Rivets, Bolts and Nuts, &c., Bridges and Turn-Tables.
General Office, 237 South Third St., Philadelphia. Works at Allentown, Pa.
EDWARD CORNING, 15 Cortlandt St., New York, New York Sales Agent.

PLYMOUTH ROLLING MILL CO., Conshohocken, PA.,
MANUFACTURERS OF

Pig Iron, Foundry and Forge.
Plate and Sheet Steel, Every description of Light Plates and Sheets of Steel.
Puddled Bars, Best Bloom, Tube, Cleaned, Best Refined, Skelp, Blue Annealed and Common.
Plate and Sheet Iron, Best Bloom, Tube, Cleaned, Best Refined, Skelp, Blue Annealed and Common.
Particular attention given to Iron for Special Purposes.

TESTED CHAINS.
Bradlee & Co., Empire Chain Works,
Beach & Otis Sts., Philadelphia.

Chains for Foundry Cranes and Slings.
"D. B. G." Special Crane Chain.
Steel and Iron Dredging, Slope and Mining Chains.
Ship's Cables and Marine Railway Chains.

CUMBERLAND NAIL AND IRON CO.,
MANUFACTURERS OF
"CUMBERLAND" NAILS & WROUGHT IRON PIPE,
43 North Water St., and 44 North Delaware Ave., PHILADELPHIA.

J. Tatnall Lea & Co.,
Successors to CABEEN & CO.,
IRON COMMISSION MERCHANTS,
No. 400 Chestnut Street, Philadelphia.
BESSEMER, MILL AND FOUNDRY PIG IRON, SKELP IRON, MUCK AND SCRAP BARS, NATIVE AND FOREIGN ORES. AGENTS FOR CONNELLSVILLE COKE.

BOOTH, GARRETT & BLAIR,
ANALYTICAL AND CONSULTING CHEMISTS,
919 and 921 Chant St. (10th St., above Chestnut St.), Philadelphia, Pa.
Established in 1836.

Analysis of Ores, Waters, Metals and Alloys of all kinds. A special department for the
ANALYSIS OF IRON AND STEEL,
fitted with all the apparatus and appliances for the rapid and accurate analysis of Iron, Steel, Iron Ores, Slags, Limestones, Coals, Clays, Fire Sands, &c. Agents for sampling ores in New York and Baltimore. Price lists on application.

EDWARD J. ETING,
IRON BROKER & COMMISSION MERCHANT
222 S. THIRD ST., PHILADELPHIA, PA.
PIG, BAR and RAILROAD IRON
OLD RAILS, SCRAP, &c.
Agent for the
Mount Savage Fire Brick.
Eastern Penna., West New Jersey and Delaware
AGENT FOR IRONDALE FURNACE, PRESTON COUNTY, W. VIRGINIA.

STORAGE YARD, Pier No. 57 South (old Navy Yard) which is connected with Penn. R. R. and its various connections. Negotiable Warehouse Receipts issued. CASH ADVANCES MADE ON IRON.

JUSTICE COX, JR., CHARLES K. BARNES.
JUSTICE COX, JR., & CO.,
AGENTS FOR
CATASAUQUA M'FG. CO.,
Iron, Steel,
Bars, Boiler, Tank and Bridge Plates; Skelp Angles and Shapes; Chicks, Montgomery Conewago and Alice Furnaces.
PIG IRON
for Foundries and Mills.
ERIE FORGE CO., LTD. Iron and Steel Forgings Every shape.
224 South Fourth Street, - Phila., Pa.

Jerome Keeley & Co.,
206 Walnut Place, Phila.,
Selling Agents for CHARCOAL and ANTHRACITE BLOOMS, PIG IRON, BAR IRON, SHEET IRON STEEL and IRON RAILS, IRON CLAD STEEL RAILS and BARS, MAGNETIC and HEMATITE IRON ORES, FIRE BRICK, COAL and COKE, MUCK BARS, Handle Old Iron and Steel Rails, Scrap Iron, &c. Examines and negotiates sales of Iron and Coal properties.
E. H. Wilson. A. Kaiser. J. R. M. Hiron.
E. H. WILSON & CO.,
222 and 224 South Third St., Philadelphia,
BROKERS AND DEALERS IN

IRON AND STEEL.
Correspondence solicited.

J. W. HOFFMAN & CO.,
IRON COMMISSION MERCHANTS
208 South Fourth St., Philadelphia.

Selling Agents PINE IRON WORKS, Pine Brand Plates; GLASGOW IRON CO., Plates and Muck Bars; SPRANG STEEL & IRON CO. (Limited), Siemens Martin (Open Hearth) Steel, Universal and Sheared Plates, Angles and Shapes.

JNO. L. HOGAN,
IRON COMMISSION MERCHANT,
216 SOUTH FOURTH ST., PHILA.
Pig Iron & Ores, Steel & Iron Blooms
Agent for Brier Hill Iron and Coal Co.,
Youngstown Steel Co. Open Hearth Metal,
Charcoal Iron, Connelville Coke,
Old Rails, Scrap, &c.

Andover Pig Iron FOR BEST MILD PRODUCTS.
Andover Chi'ron for Carwheels, &c.
Each Pig marked exact chill depth (4 in. to 1 1/4 in.).
A. Whitney & Sons' standard test.
F. A. COMLY, Treas.
J. WESLEY PULLMAN, Agent. 240 So. 3d St., Phila

NORTH BROTHERS MFG. CO.,
Iron Founders,
Light Castings a Specialty.
N. W. Cor. 23d and Race Streets
PHILADELPHIA.
Correspondence solicited.

A. WHITNEY & SONS,
CAR WHEEL WORKS,
PHILADELPHIA.
Special Wheel's for Furnace and Mine Cars.

J. J. MOHR,
430 WALNUT ST., PHILA., PA.
SOLE AGENT FOR
Sheridan, Leesport, Temple, Lynchburg, Millcreek and Mt. Laurel

Foundry PIG IRON and Forge
CHARCOAL PIG IRON.
Also Woodbridge Clay Mining Co.'s Fire Brick.
JAS. G. LINDSAY. THOS. S. PARVIN
LINDSAY, PARVIN & CO.,
328 Walnut St., Phila.,
Iron and Steel Structural Material
FOR ALL PURPOSES.

Estimates furnished for Iron and Steel Structures and Railway construction. Correspondence solicited with railroad contractors.

L. & R. WISTER & CO.,
IRON COMMISSION MERCHANTS,
257 So. 4th St., Philadelphia.

Agents
Kemble and Norway Foundry and Forge Pig Iron.
Weybrooke C. R. Charcoal Pig Iron. Ferguson Red Short Pig Iron.

DEALERS IN ALL KINDS OF SCRAP IRON.
MORRIS, WHEELER & CO.
Iron, Steel and Nails.

WAREHOUSE & OFFICES, 16th & Market Sts., PHILA., PA.
SALES OFFICES, 400 Chestnut St. PHILA., PA.
New York Address, 14 CLIFF ST.

HENRY LEVIS & CO.,
Manufacturers' Agents

For Iron and Steel Rails, Car Wheels, Boiler and Sheet Iron and General Railway Equipments.
Old Rails, Axles and Wheels bought and sold
234 S. 4th St., Philadelphia.

Frank K. Escherick Barclay W.
ESHERICK & CO.,
263 So. 4th St. PHILADELPHIA

Iron and Steel of All Description.
Selling Agents for Cleveland City Forge and Iron Co. Forgings; Central Iron and Steel Works; Plates of Iron and Steel; Danville Nail and Mfg. Co., Iron and Steel Nails, Boiler Tubes; Bridge, Car and Boat Specifications a Specialty.

ESTABLISHED IN 1848.
SINGER, NIMICK & CO., Ltd.,
 PITTSBURGH, PA.,
 MANUFACTURERS OF ALL KINDS OF
**HAMMERED AND ROLLED
 STEEL,**

WARRANTED EQUAL TO ANY PRODUCED.
BEST REFINED TOOL CAST STEEL

For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear-Knives,
 Cold-Chisels and Machinists' Tools generally.

SAW PLATES

For Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.

Sheet Steel

For Springs, Billet Web and Hand Saws, Shovels, Cotton Gin Saws,
 Stamping Cold, &c., &c.

SIEMENS-MARTIN (Open-Hearth) PLATE STEEL

For Boilers, Fire-Boxes, Smoke-Stacks, Tanks, &c.

All our Plate and Sheet Steel being rolled by a Patented Improvement, is unequalled for
 surface finish and exactness of gauge.

ROUND MACHINERY CAST STEEL

For Shafting, Spindles, Rollers, &c., &c.

File, Fork, Hoe, Rake, E. R. Frog, Toe-Calk, Sleigh-Shoe and Tire Steel, &c.;
 Cast and German Spring and Pile Steel.

ron Center " Cast Pile Steel. | Finished Rolling Pile Couplers, with Patent Screw Hubs
 oft Steel Center " Cast Pile Steel. | Agricultural Steel cut to any pattern desired. (attached.
 lid Soft Center " Cast Pile Steel. | Steel Forgings made to order.

Represented a 248 Pearl and 18 Cliff Sts., New York, by

HOGAN & SON, General Agents for Eastern and New England States.
 GEORGE M. HOGAN, 417 Commerce St., Philadelphia, and FULLER, DANA & FITZ, 110 North St., Boston.

Moorhead McCleane Company,
Soho Mills, Pittsburgh, Pa., U. S. A.

MANUFACTURERS OF

**SHIP, TANK
 AND
 BRIDGE PLATE,
 SKELP
 SHEET IRONS,
 Special Sizes.
 AND
 WIDE SHEETS.**

**Iron, Steel or
 COMPOUND
 ARMOR
 PLATES,
 UP TO 18 INCHES THICK.
 GUARANTEED TO STAND
 ADMIRALTY TESTS.
 AND
 STEEL OR IRON PLATES
 FOR MERCHANT VESSELS
 OR YACHTS.**

**Galvanized
 Sheets
 (Patent Leveled).
 Only Manufacturers
 SOHO
 CHB
 TRADE MARK
 And
 PLANET Brands.**

Open Hearth Steel.

SHIP PLATE, TANK, BOILER, FLANGE and FIRE-BOX.

FRANKFORD STEEL COMPANY

FRANKFORD, PHILA., PA.,

STEEL RAILROAD AND MACHINE FORGINGS

SOLID CRUCIBLE STEEL CASTINGS

Best Grades of Tool and Machinery Steel.

GEORGE BROOKE, President.

GEO. W. HARRISON, Treasurer.

THE E. & G. BROOKE IRON CO.,
 BIRDSBORO, BERKS CO. PA.,

MANUFACTURERS OF

ANCHOR NAILS AND SPIKES. BRAND

Capacity, 1000 Kegs per Day.

Made from their own Pig Iron, Insuring Regularity and Superiority in Quality.

ALSO

**FOUNDRY AND FORGE PIG IRON,
 AND COLD BLAST CHARCOAL CAR WHEEL IRON.**

**OLD DOMINION
 CUT NAILS, BAR IRON.**

R. E. BLANKENSHIP, President.

RICHMOND, VA.

NOW BUILDING A TWO-CONVERTER BESSEMER STEEL PLANT.

RIVERSIDE IRON WORKS,

MANUFACTURERS OF RIVERSIDE

STEEL NAILS

Pig Iron, Bar Iron, Bar Steel, Steel Blooms, Steel Billets,
 Small T Nails, Flat Nails of Iron or Steel, Fish Bars of Iron or Steel.

WHEELING, W. VA.

**TACKS & WIRE NAILS,
 BOAT NAILS,
 Regular and Chisel Pointed; Black and Galvanized.
 SHOE NAILS, &c. &c.**

Lining and Saddle Nails, 3d. Fine Lath Nails.

BOSTON SALESROOM,
 70 Portland St.

BALTIMORE SALESROOM,
 32 Light St.

CINCINNATI SALESROOM,
 349 Main St.

NEW YORK SALESROOM,
 116 Chambers St.

AMERICAN TACK CO., FAIRHAVEN, MASS.

Established 1861.
THOMAS C. BURROWS,
 Agent for Jersey City Steel Company,
 Successors to JAS. R. THOMPSON & CO.
 Manufacturers of **STEEL** Of All Descriptions.
WAREHOUSE, 99 and 101 JOHN ST., NEW YORK.

TERRE HAUTE IRON AND NAIL WORKS
TERRE HAUTE, IND.

Manufacturers of **IRON and STEEL NAILS.**

Reed & Prince, Worcester, Mass.,

MANUFACTURERS OF BLACK AND TINNED NORWAY IRON

RIVETS AND BURRS

of Best Quality and Finish.

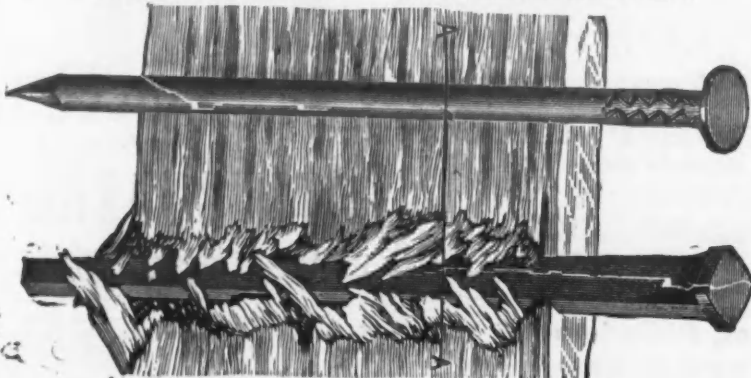
Prices on Application.

THE SALEM WIRE NAIL CO.,

SALEM, OHIO,

—MANUFACTURERS OF—

WIRE NAILS.



*The above Cut represents the Effect on Wood
 of a Cut Nail and a pointed
 Steel Wire Nail.*

W. S. ESTEY, No. 71 FULTON ST., NEW YORK.
 MANUFACTURER OF
 Of Brass, Copper, Iron, Galvanized and
 Steel Wire of all Meshes and Grades.
 For Mining, Milling and all other purposes.
 Locomotive Spark Wire Cloth, &c.
 For Bank, Office and Counter Railing,
 Store Fronts, Window Guards &c.
 Sifting Machine. Decoy Rat Trap.

Galvanized Wire Cloth for Protecting Windows, Sky Lights, &c.

WIRE CLOTH FOR SUGAR REFINERIES.

GERMAN CLOTH FOR CENTRIFUGAL MACHINES.

Coal and Sand Screens. Riddles for Export and Foundry Use. Galvanized Twist
 Netting for Fencing, Henneries, Trellises, &c. Wire Window Screens.

IRON BOLTING CLOTH. SILK BOLTING CLOTH.

Wire Work and Wire Goods of Every Description.

S T PATENT SIFTER,

S T PATENT RAT TRAPS.

Oliver's Patent Decoy Rat Traps.

S. T. PAT. ADJUSTABLE FOUNDRY RIDDLES.

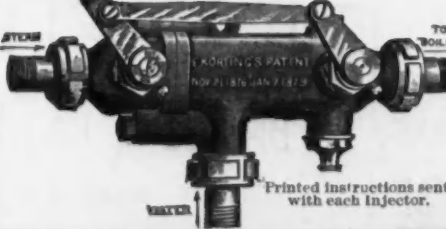
Inverted—Showing Clamps.

Showing Different Parts.

The Korting Double Tube Injector

ACKNOWLEDGED AS THE LEADING BOILER FEEDER,

Operated with one handle.



Will lift either hot or cold water from
 highest suction, or will take supply from
 tanks above or street water pressure
FEEDS HOT WATER TO BOILER.
 Uses no more steam than any steam
 pump. Will feed through heaters. No
 lubrication necessary. Will not get out of
 order. Is the only Boiler Feeder that works
 if suction Pipe is heated. Send for circular
 and price list.

Amos Allen, 109 Liberty St., N. Y.

PENNSYLVANIA BOLT & NUT CO.

LEBANON, PA.

MANUFACTURERS OF MACHINE BOLTS, TRACK BOLTS, WASHERS,
 LAG-SCREWS AND SKEIN-SCREWS, BOILER AND BRIDGE RIVETS,
 HOT PRESSED NUTS WITH REAMED HOLES, CHAMFERED,
 TRIMMED AND REAMED NUTS AND REFINED BAR IRON.
 SEND FOR CATALOGUE & PRICES.

THE ROYAL DAUBER.

WITH MUD SCRAPER ATTACHED.



This Brush has but to be seen to be appreciated.

An entirely new thing in Blacking Brushes, consisting solely of TINNED MALLEABLE IRON and
 PURE BRISTLES. **SOLID, ROUND-FACED, INDESTRUCTIBLE.**
SOLID.—Not bored and drawn, nor secured with pitch or cement. Not several small knots, but ONE
 OLID KNOT OF PURE BRISTLES. NO HORSEHAIR.
ROUND-FACED.—Takes Blacking from the box on its centre instead of its edges, and will therefore
 read it even, smoother and thinner, ensuring a better polish than any flat-faced brush.
INDESTRUCTIBLE.—Because the only materials used are tin-coated iron and bristles, put together to
 stay, the knot of bristles being held in ONE SOLID MASS, BY COMPRESSION, IN A GRIP OF IRON, and
 fastened with an iron rivet. Warranted not to "spread" or "clog" with blacking.

WILL OUTLAST A DOZEN OF ANY OTHER KIND.

This DAUBING BRUSH is made WITH A SCRAPER FOR REMOVING MUD FROM THE CREVICES
 OF THE SHOES. The utility of this is too apparent to need a word of commendation.

PEABODY & PARKS, MFRS., TROY, N. Y.

WROUGHT IRON

BOILER TUBES.

Steam, Gas and Water Pipe, Oil
 Well Tubing, Casing

AND

LINE PIPE.

Cotton Presses, Forgings, Rolling
 Mill and General Machinery.

READING IRON WORKS.

261 S. Fourth St., Philadelphia.



FRANKLIN S. MILES,
 Manufacturer of
 Brass, Iron, Steel and German Silver
SCREWS,
 205 Quarry St., Philadelphia.

Special to Foundrymen.

FOREST CITY MACHINE WORKS,



Manufacturers of
 WROUGHT IRON CHAPLETS, CHAPLET STEMS
 AND STUDS, Superior Large Head Rivets, Stacks.

CLEVELAND, OHIO.

COBB & DREW,

PLYMOUTH, MASS.

Manufacturers of Copper, Brass and Iron Rivets;
 Common and Swedes Iron Leathered, Carpet, Lace
 and Gimp Tacks; Finishing, Hungarian, Trunk,
 Clout and Cigar Box Nails, &c. Rivets made to
 order.

NEW YORK AGENCY.

**DISOWAY & HENDERSON,
 HARDWARE,**

165 GREENWICH STREET.

Agents for the Philadelphia Star Carriage and Tire Bolts

WALKLEY HARDWARE CO.,

PLANTVILLE, CONN.,

are putting up special
 brands of Steel Carpet
 Tacks in an original form.
 Something new and at-
 tractive combined with
 good quality and correct
 price. Send for photo-
 graph of latest novelty.

E. PHILLIPS & SONS,

MANUFACTURERS,

South Hanover, Mass.

TACKS.

F. R. EMMONS & BRO.

21 WARREN STREET,

New York.

JEFFERSON IRON WORKS,

Steubenville, Ohio,

MANUFACTURERS OF

JEFFERSON STEEL NAILS

WITH NATURAL GAS FUEL.

THE INTERNATIONAL RESOLVENT

Guaranteed to remove and prevent scale in steam
 boilers. Will send any size package on 60 days' time,
 to prove goods as represented. Price 7 cents per
 pound by the barrel; 7½ cents by half-barrel and 8
 cents by one-fourth barrel.
 Send all communications to

INTERNATIONAL MFG. CO.,

270 Pearl St., Cleveland Ohio.

GLASS The most perfect and non-corrosive valve seat, used only in Myers' Pumps.

MYERS' FORCE-PUMP

Adapted to open and drilled wells. The only double acting force-pumps furnished with expansive plunger bucket and Glass Valve-Seat. The only successful Drill Well Pump made.

Simple, durable, powerful, easy to operate. Never affected by frost.

MYERS' DOUBLE LOCK REVERSIBLE HAY CARRIER.

A perfect reversible carrier. New Myers' iron, steel and wood track carriers. The simplest carriers made. Double and single harpoon hay forks, pulleys, grapples, sling attachments, grapples, hay forks, door and hanging hooks, etc.

F. E. MYERS & BRO., ASHLAND, O.

JOHN MAXWELL,
MANUFACTURER OF PATENTED
BRASS, BRIGHT
TINNED WIRE
& JAPANNED
BIRD CAGES.

The cheapest and most saleable in market. Catalogues and Price Lists furnished to the Trade.

247 & 249 Pearl St.
New York.



Full size of Band for Brass and Tinned Wire Cages.

Patterson's Patent Forges

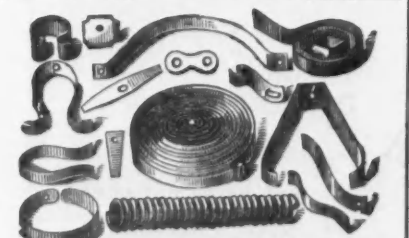


BROWN & PATTERSON, Marcy Ave. and Hope Street,
BROOKLYN, N. Y.

DIAMOND WRENCH CO.



PORTLAND, MAINE.



DUNBAR BROS.,
Manufacturers of
Clock Springs and Small Springs
of every description, from best Cast Steel.
BRISTOL, CONN.

Springfield Glue & Emery Wheel Co.
SPRINGFIELD, MASS.



W. & B. DOUGLAS, Middletown, Conn.,
The Oldest and Most Extensive Manufacturers of
Pumps, Hydraulic Rams, Garden Engines,
Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill Pumps
and Other Hydraulic Machines in the World.



WROUGHT STEEL SINKS.



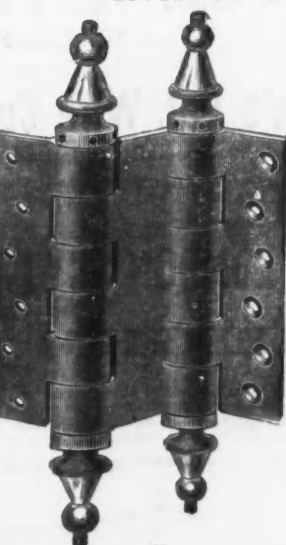
One of the strong points of these sinks is the new coupling with which they are now supplied, and which is pronounced by all plumbers the best on the market. It is used with both lead and wrought-iron pipe; is a neat, reliable coupling, and is easily detached for the purpose of pumping out the pipe. The strainer and all parts of the coupling are tinned, and are furnished with all sinks without extra charge.

The fact of the great strength and durability of this sink, as it is practically free from danger of breakage in transportation, handling or use, is a strong point in its favor, and that its merits are recognized by most competent judges is evident from the fact that leading houses which have been interested in the common article have taken up the Wrought Steel Sink. Twenty-five per cent. is saved in freight by purchasing Steel Sinks. Orders come from all parts of the United States, Canada, Europe and Australia.

BRANCH WAREHOUSES:

85 and 87 JOHN STREET, NEW YORK, and 197 LAKE STREET, CHICAGO, ILL.

UNION MANUFACTURING CO.,
MANUFACTURERS OF ALL STYLES
Plain and Ornamental Butts,
LOOSE PIN REVERSIBLE, CAST FAST AND LOOSE,



Drilled and Wire Jointed, Japanned, Figured Enamelled, Nickel Plated and Real Bronze Butts.

Also a Full Line of

IRON AND BRASS PUMPS,

Cistern, Well and Force Pumps, Yard Drive Well, Garden Engine and Steam Boiler Pumps, Hydraulic Rams, &c., and all with the most modern improvements.

UNION SPIRAL SPRING HINGES.

We beg to call the attention of Architects, Builders, Dealers, and all interested parties, to our Spiral Spring Hinge, knowing it to be an effective and durable one, neat in appearance, easy to put on, and not liable to get out of order. The Springs are made from wire made expressly for us and for this particular purpose, with the view of great elasticity, durability and power. They produce a continuous pressure from the point where the door is wide open until it is closed, and then hold it perfectly in position. It has a solid pintal in connection with short hollow ones, causing little or no friction, the whole power of the Spring being exerted in swinging the door. It is a fast joint, and can be used for either right or left hand, allowing the dealer to carry less stock, and the builder will never get the wrong hand.

37 FINE CASTINGS & SPECIALTY.

New Britain, - Connecticut.

Warehouse: 103 Chambers Street, New York.

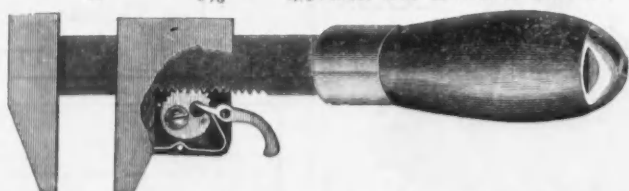
Illustrated Catalogue and Price List furnished upon application.

UTILITY WRENCH
WARRANTED.

The New All-Forged and only Adjustable Solid Wrench.

PRICE LIST.

No.	Length over all, 4 1/2 in. Span, 1 1/2 in.	PRICE.
No. 1.	" 7 " " 2 1/2 "	\$1.00
No. 2.	" 8 " " 3 " "	1.25
No. 3.	" 10 " " 4 " "	2.00



Patent Aug. 12, 78 and Sept. 4, 83.

SPECIAL NOTICE.—Under the Greatest Strain the Sliding Jaw will not Yield a Hair.

SYNOPSIS OF MERITS:—Quickest Adjusting Wrench in the World. All its Parts are Warranted. All its Parts are Interchangeable. All its Parts are Forged. All its Parts are Case Hardened.

It has proved itself to be the Strongest and Most Durable Wrench ever made.

UTILITY WRENCH CO., LIMITED.

Office: No. 231 E. 4th St., New York, N.Y., U.S.A. Factory: Hamilton St. & New Jersey R.R. Ave., Newark, N.J., U.S.A.

Southington Cutlery Co.,
SOUTHINGTON, CONN.
Only Manufacturers of the
GENUINE HORSE SHOE CURRY COMBS.

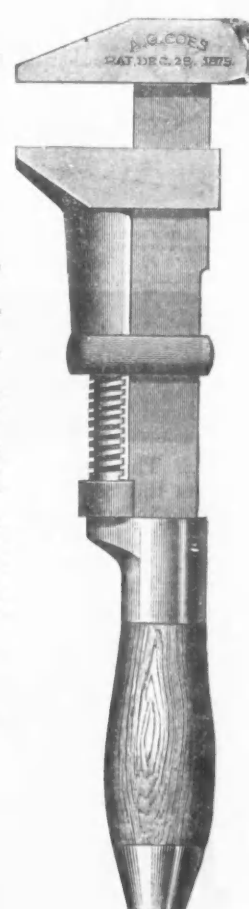
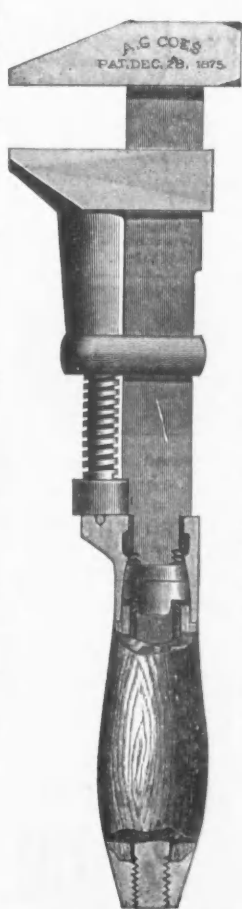
Also Manufacturers of Steel and Iron Squares, Wood Screws, Razors and Pocket Cutlery. Send for Prices.

O. W. BULLOCK, SPRINGFIELD, MASS.

Manufactures nearly ONE THOUSAND styles, sizes and varieties of
Extra Fine, Warranted Hand and Bench Tools,
for Watch, Clock, Piano and Cabinet Makers, Jewelers, Printers, Electrotypers, Dentists, Amateurs, Carpenters, Builders, Machinists and almost every kind of Mechanic or Artisan. Give American Mechanics a chance to buy American, instead of Foreign Tools.
Send for New Illustrated Catalogue and Price List.

Established in 1839.

A. G. Coes & Co.,
WORCESTER, MASS.,
MANUFACTURERS OF
A. G. COES' PATENT SCREW WRENCHES,



The Strongest Wrench made, and the only successful re-enforced bar. The Ferrule is firmly secured in place by a nut screwed on the bar.

Particular attention is called to the way in which the handle is made and fastened to the shank.

This Handle is made better and stronger than heretofore by using our new Cup Tip at the end which encloses the wood and keeps it from splitting. This is the only wrench which has the wood handle firmly secured and held together at each end, and it will stand more rough usage and last longer than any now made. It is not affected by heat, cold or moisture.

None Genuine unless Stamped,

A. G. COES & CO.

Warehouse:

113 Chambers
and 95 Reade Sts.,
NEW YORK.

JOHN H. GRAHAM & CO., Agts.

Bemis & Call Hardware & Tool Co.
PATENT COMBINATION WRENCH.
Case-Hardened Throughout. Paris Interchangeable.

This Wrench not only combines the superior qualities of a Gas Pipe Wrench but also all the requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.



No. 3 PATENT PIPE WRENCH.

The serrated jaw of the Wrench are interchangeable; that is, the same serrated plate may be used for either the stationary or sliding jaw, so that if one plate is broken another can be furnished adapted to either jaw without express designation. The slides, nuts and various parts are also interchangeable, thus easily repairing the Wrench at very small expense, and with as perfect practicality for further use as when the Wrench was new.

For Circulars and Price List, address:
BEMIS & CALL HARDWARE & TOOL COMPANY, Springfield, Mass.

ACME WRENCH.
MANUFACTURED ONLY BY



GEO. W. MARBLE,
28 to 32 South Canal St., CHICAGO
Write for Prices and Discounts.

Adams Swing.

The popularity of the Adams Swing in the short time it has been introduced is phenomenal.

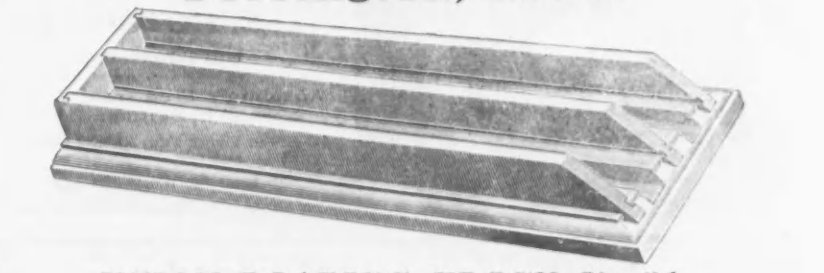
The Swing is constructed on original mechanical principles. The frame is so interlocked as to be prevented from sagging, even if the bolts are loose, a feature not possessed by any other swing manufactured. There are two sizes manufactured, adapted for both lawn and park. No. 1, or infant size, has standards 2 feet 6 inches long, with a spread of about 4 feet, and 5 feet in width. The frame work is so constructed that by taking out two bolts the standards will close up, and by taking out the bolts of the two cross pieces the frame can be closely folded ready for shipping. The swing can be put up or taken down ready for packing in 10 minutes.

The weight of the Swing is a little less than 100 pounds. It is very strong, having been tested by four men whose weight aggregated over 600 pounds.

The No. 2, or parlor size, has standards about 7 feet long, and otherwise proportioned in size, weighing less than 75 pounds. They combine simplicity of construction, beauty and strength, and can be operated with ease by small children in the swing.

For Sale by all Leading Dealers.

GEO. B. TURRELL, President. C. F. FERNALD, Manager. M. B. DUNBAR, Treasurer.
UNION HARDWARE CO.
Torrington, Conn.



UNION LOADING BLOCK No. 01.
A new and improved device for use in loading Cartridge Shells.
WE MAKE A FULL LINE OF
GUN IMPLEMENTS.
New York Office, 95 Chambers St., in charge of Tower & Lyon.

Paris, 1878. **McCAFFREY & BRO.,** For Superiority.
PENNSYLVANIA FILE WORKS,
 PHILADELPHIA, PA., U. S.

Manufacture and keep in stock a full line of **FILES** and **RASPS** only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade. *Superiority acknowledged wherever used, sold or exhibited.*



The object of this Diamond Point can be readily seen, in that it prevents the Set from slipping from the head of the nail while in use, thus saving in many cases some valuable piece of work. **IT IS FAST TAKING THE PLACE OF EVERY OTHER NAIL SET. ONCE SEEN MECHANICS WILL HAVE NO OTHER.** These Sets are carefully made from the **BEST QUALITY OF TOOL STEEL.** The Points are turned and thoroughly tempered, and will not break off. **EACH SET FULLY WARRANTED.** The Trade Supplied. Put up in Boxes $\frac{1}{2}$ Dozen, 1 Dozen, $\frac{1}{2}$ GROSS and 1 GROSS. Assorted Sizes. Prices and Terms upon application.

MANUFACTURED ONLY BY
THE EDWARD STORM SPRING CO., Limited,
JOHN H. GRAHAM & CO.,
 Sole Manufacturers' Agents,
 113 CHAMBERS ST., NEW YORK CITY.



LIGHTNING HAY KNIVES
 WEYMOUTH'S PATENT.

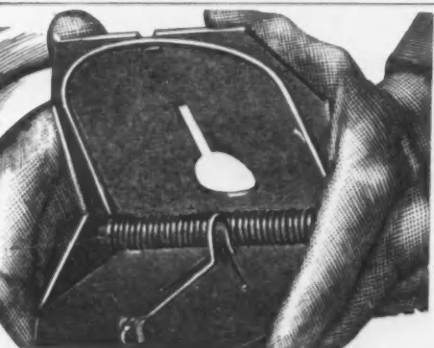
This Knife is the **BEST IN USE** for cutting down hay and straw in mow and stack cutting fine feed from bales, cutting corn stalks for feed, cutting post & ditching marshes. The blade is **Best Cast Steel**, spring temper, easily sharpened, and is giving universal satisfaction. A few moments' trial will show its merits, and parties using it are unwilling to do without it. Its sales are fast increasing for export as well as home trade, and it seems destined to take the place of all other Hay Knives. They are nicely packed in boxes, 1 dozen each of 60 pounds weight, suitable for shipping by land or water to any part of the world. Manufactured only by **HIRAM HOLT & CO.,** EAST WILTON, Franklin Co., MAINE. For sale by the Hardware trade generally.

CAUTION. We are informed that various parties are infringing upon the widely-known Letters Patent granted originally to **GEORGE F. WETMOUTH** for an improved Hay Knife. The invention patented to **GEORGE F. WETMOUTH** is embodied in a sword-shaped blade provided with operating handles for working the same, the edge of the sword-blade being furnished with knife-edged serrations or teeth. **IT IS OUR PURPOSE TO PROSECUTE ALL INFRINGEMENTS,** and to hold responsible to the full extent of our ability and of the law all parties who manufacture any knife infringing upon the patent, or who deal in the same. Several suits are now pending in the U. S. Courts. **BEWARE!** All manufacturers and dealers are hereby warned of our rights, and the public are cautioned against purchasing any Hay Knives, made as described above, which are not of our genuine manufacture. EAST WILTON, Sept. 1, 1886.



W.H. CARTER'S PATENT NEEDLE HAY KNIFE, THE BEST IN THE WORLD.
 Patented April 29, 1884.
 Improvement Patented April 28, 1885.

Improvement patented April 28, 1885, of which we are the sole manufacturers, has been tested with the most celebrated knives of other makers, and has proved an easier and faster Cutter than any other. Its special excellence consists in the chisel-edge tooth shown in the engraving. It may be used for cutting hay in the mow, stack and bale; also for ditching, cutting post, or any other work for which a hay knife is used. It can be readily ground by the most inexperienced, as it requires to be ground only on one side. Should a tooth break, all that is necessary to replace the damage is to grind it once and a new chisel-tooth appears. It can ordinarily be sharpened with a common scythe stone. Try one and you will give it the preference.



HOTCHKISS IMPROVED RAT KILLER
 MANUFACTURED BY
E. S. HOTCHKISS,
 BRIDGEPORT, CONN.
 Absolutely Free from Danger in Setting.
 Cut Shows Trap BEING SET.
 Send for Illustrated List.
 Sample by Mail for 25 Cents.

HUGUNIN PAT. SCREW SASH BALANCES. Mechanical Substitutes for Weights, & widths. Sashes work as with weight. No clock springs or latches; are applied to the frame; work against the unpainted edges of the sash. No. 3, 4 1/2 x 1 1/2; No. 2, 3 1/2 x 1 1/2; No. 1, 2 1/2 x 1 1/2; ray and Maltese iron. Remember **Robert B. Hugunin, Patentee and Sole Authorized Maker**, is cast on the face-plate of the genuine goods and by which they are instantly known. The unimproved and unrecommended No. 2's have been fraudulently copied, with date of my minor patent, Nov. 8, 1877, never used on the genuine, and sold by misrepresentation, canvassing, circulars, dealers in sash goods, to injury of buyer. Spot them. The improved are made under the care of the inventor and give satisfaction. For sale by the first-class trade. Liberal discounts, according to quantity. Address, **ROBT. B. HUGUNIN WINDOW FIXTURE MFG. CO.,** Hartford, Conn., U. S. A., manufacturers of Hugunin's Patent Sash Fixtures, both Balances and Sash Locks.

PATENT SCREW TANG
 As a guarantee of the superior quality of Screw Tang Files over all others, for any that are unsatisfactory as to temper, &c., we will give in exchange two for each one that is returned to us. One Handle will last a lifetime in constant use, making it the cheapest Handle in the world. Cost 10 cents each.

J. BARTON SMITH CO.,
 Philadelphia, Pa., U. S. A.
GILBERT PARKER, President.

THE SILVER & DEMING
FEED CUTTERS.
 They are more substantial, easier to operate, have greater capacity, are less liable to accidents than any other Cutters. We build nine sizes, six for power, furnished with or without carriers. Our illustrated Catalogue contains also valuable information on the subject of Siles and Ensilage. Liberal discounts and terms to dealers. Write for prices.

Silver & Deming Mfg. Co.,
 SALEM, OHIO.
 HENION & HUBBELL, General Western Agents,
 55 N. Clinton St., Chicago.

IVES' PATENT SASH LOCK.
H. B. Ives & Co., NEW HAVEN, CONN.

Chapman Valve Mfg. Co.,
 MANUFACTURERS OF
VALVES AND GATES
 Water, Steam, Gas, Ammonia, &c.
GATE FIRE HYDRANTS,
 with and without
INDEPENDENT NOZZLE VALVES.
All Work Guaranteed.
 Works and General Office,
INDIAN ORCHARD, Mass.
 Treasurer's Office,
 72 Kilby and 112 Milk Streets,
BOSTON, Mass.

BUFFALO SCALES
STANDARD SCALES
AWARDED FIRST PREMIUM
 AT THE WORLD'S EXPOSITION, New Orleans (Four Gold Medals). All other principal makers competing. Track Scales, Hay Scales, Platform Scales, etc. Important patented **IMPROVEMENTS.** **BEST VALUE FOR YOUR MONEY.** For circulars, terms and full particulars, address **BUFFALO SCALE COMPANY, BUFFALO, N. Y.**

BLACK DIAMOND FILE WORKS.
G. & H. BARNETT,
 21 to 43 RICHMOND STREET, - - - PHILADELPHIA.

CHARLES B. PAUL, MANUFACTURER OF **HAND CUT FILES,**
 Warranted Cast Steel. 467 Keap St., Brooklyn, N. Y.
 All descriptions of Files made to order. Price List mailed on application. Established 1863.

EXCLUSIVELY HAND-CUT FILES AND RASPS,
 MANUFACTURED BY THE
CHELSEA FILE WORKS, NORWICH, CONN.

The superiority of our Horse Rasps over all others is universally admitted by those who use them. Their high degree of excellence will be scrupulously maintained. Give them a trial, and use no others.

J. M. KING & CO.,
 WATERFORD, N. Y.
 Manufacturers of the
Button's Pat. Wire Cutter and Plier Combined.
 Specially Adapted for Use on Wire Fence.

Also Manufacturers of **BLACKSMITHS' STOCKS and DIES, FLUG and TAPER TAPS, HAND, NUT and SCREW TAPS, PIPE TAPS and REAMERS.**
 Price List on Application. Established by DANIEL B. KING, 1829.

NEW LONDON SCYTHE CO., SCYTHEVILLE, N. H., U.S.A.
 MANUFACTURERS OF
THE GEM HAY KNIFE.

Patented July 29th, 1875. We desire to call especial attention to our patent "Gem" Hay Knives, which are rapidly gaining in favor with the public. They are made from the best Cast Steel, tempered in oil, and their peculiar construction enables the user to do the work with greater ease and rapidly than with any other knife. Send for Descriptive Circular and Price List.

LIGGETT SPRING AND AXLE CO., LIMITED,
 MANUFACTURERS OF
Springs and Axles
 For Coaches, Phaetons, Buggies, Wagons, &c.
PITTSBURGH, PA.

The Williams Printing Company,
 5, 7 and 9 Elm St.,
 NEW YORK.
General Book, Job, and Commercial Printers.
 Estimates Furnished
 For all Classes of Work.
GOOD WORK. FULL COUNT. FAIR PRICES.

RIEHLÉ BROS.
 STANDARD
SCALES
 AND
TESTING MACHINES
 Railroad and Warehouse Trucks of all sizes and descriptions.

GARRY IRON ROOFING COMPANY
 Largest manufacturers of Iron Roofing in the world. Manufacturers of all kinds of **IRON ROOFING** Crimped and Corrugated Sliding Iron Tile or Shingle. Fire-Proof Doors, Shutters, &c.
IRON ORE PAINT AND CEMENT.
 153-155 MERWIN STREET, CLEVELAND, O.
 Send for Circular and Price List No. 15.

THE
Favorite Family Scale.

Light, Compact, Durable and Convenient.

This excellent Scale for family use is manufactured only by

JOHN CHATILLON & SONS,

85, 87 and 89 CLIFF ST., NEW YORK.

Also Makers of other
SCALES and BUTCHERS' TOOLS.**PYROMETERS**

FOR
blast Furnaces, Bakery Ovens, Boiler Flues, Super
heated Steam, Oil Still, Zinc and Lead Baths, also,
REVOLUTION INDICATORS,
Which constantly indicate, without the use of a
watch, the number of turns per minute made by a
Steam Engine. Made under the patents of
EDWARD BROWN, 311 Walnut St., Philadelphia.
— ESTABLISHED 1860. —

**"THE DETECTIVE
Burglar Alarm."**Patented in this and
other Countries.

Price reduced to \$1 per
dozen, or \$10 per gross.
200 gross sold in the past
two years (50 gross sold in
London).

Largest sales last month
of any month in the past
two years.
Sample sent by mail on
receipt of 20 cents.

Owned and Manufactured by
Spencer E. Carr & Co.,Ninth and Jefferson Sts.,
Philadelphia, Pa.**J. M. STUTZMAN,**

181 William St., New York.

Manufacturer of

Steel Alphabets

DIE LETTERS FOR SEAL

ENGRAVERS,

BRANDS, SEALS,

POST-OFFICE STAMPS,

Door Plates,

Steel Stencil-Cutting Dies,

Soap Moulds and Brass
Stamps.

SEND FOR PRICE LIST.

JOSEPH SCHEIDER & CO.(Successors to MANHATTAN STAMPING WORKS,
Manufacturers of**Plain and Retinned Deep****Stamped Ware,**

Tinner's Trimmings, Japanned Ware,

**ALSO PLAIN AND EXTRA HEAVY
POLISHED WARE.**Nos. 103, 105, 107, 109 North 3d Street,
BROOKLYN, E. D.We call attention to our line of Watering Pots, on
which we quote:

Quarts, 1 2 3 4 6
With Common Tin Roses, 140, 180, 210, 220, 300 pr. doz
With Patent Zinc Roses, 180, 220, 250, 270, 350
Quarts, 8 10 12 16
With Common Tin Roses, 300, 420, 140, 600 pr. doz
With Patent Zinc Roses, 410, 480, 600, 720.

Special prices on large quantities.

FACTS FOR MANUFACTURERS.**Special Wheels for Special Work.**Send for description and prices to
WALTHAM EMERY WHEEL CO., Waltham, Mass.**CHEMICALS AND APPARATUS**

FOR THE ANALYSIS OF

**Ores, Iron, Steel, Fuel, Fluxes, Furnace
Gases, &c., our specialty.**

Being direct Importers and Manufacturers, we can offer superior
inducements. Sole Agents for
Trommsdorff's Chemicals; Joseph Kavalier's
Superior Bohemian Glass; Schleicher & Schnell's
Chemically Pure and Common Filter Paper;
E. March Soehne's, Acid Proof German Stoneware
Professor Jolly's Spiral Balances.

SPECIALTIES:

Strictly Chemically Pure Acids and Chemicals.
Platinum in all its shapes. Glass Blowing and
Engraving in all its branches. Superior
German Porcelain, Balances, Weights,
Testing Apparatus.

**EIMER & AMEND,** Nos. 205 to 211 Third Avenue, New York.

ILLUSTRATED CATALOGUE MAILED ON APPLICATION.

STANLEY'S**Beading, Rabber & Slitting Plane.****PRICE.**

No. 45. Iron Stock and Fence...\$8.00

A Southern Carpenter writes
concerning this tool: "A first-class Me-
chanic's pet. Worth its weight in
silver."

A Western Carpenter writes con-
cerning this tool: "I have just finished
one house, on which it paid for itself."

FOR SALE BY ALL

Hardware Dealers.**DUQUESNE FORGE.****MILLER FORGE COMPANY, Lim.**

MANUFACTURERS OF

IRON FORGINGS STEELWorks at **RANKIN STATION, B. & O. R. R.**Branch Office and P. O. Address, **PITTSBURGH, PA.****BOILER AND PIPE COVERINGS.**

Absolutely Fire Proof, Light and Cheap.

**EASY TO APPLY.**

Miners and Manufactur-
ers, Braided Packing, Mill
Board, Sheathing and
Specialties.

ASBESTOS CHALMERS-SPENCE CO.,

419-425 8th Street, N. Y.

BRANCHES:

Boston, 19 Pearl St. Phila., 34 N. 2d St. Chicago, 144-146 E. Lake St. Pittsburgh, 37 Lewis Block.

SWIFT RUNNING EMERY WHEELS.

THE ORIGINAL

**SOLID VULCANITE
EMERY WHEELS**Runs Easy and Safe,
Cool and True.Is More Durable — Hence Cheaper.
A trial will convince you of this.

KNIFE GRINDING WHEELS A SPECIALTY.

NEW YORK BELTING AND PACKING CO.,

Sole Manufacturers, 15 Park Row, New York.

J. H. CHEEVER, Treas.

PERSICANER & CO., Pickhuben 5, Hamburg, Germany.

FORBES & CURTIS,

58 John St., Bridgeport, Conn., U. S. A.,

MANUFACTURERS OF THE

Forbes Patent Die Stock.PIPE CUTTING AND THREADING MA-
CHINES FOR HAND OR POWER.Steam and Gas-Fitters' Hand Tools,
&c., &c.

Send for Catalogue. Mention Paper.

No. 1 Stock, range 1-4 in. to
2 in., Right and Left.**FLORENCE
OIL STOVES**

ARE LIKE FEW OTHER LUXURIES,
A NECESSITY AND ARE THE
BEST FOR ALL PURPOSES
FOR SALE EVERYWHERE MADE BY
FLORENCE MACHINE CO.
FLORENCE, MASS.

New York Office, 27 Union Square.

Duplex Reversible Screw Driver.TWO SIZES IN
ONE, AND AT
THE PRICE OF
ONE.

Send for Descriptive Circular and Price List.

C. THOMAS & CO.,

Manufacturers,

BIRMINGHAM, CONN.**The Comparative Value of Steam and
Hot Water for Transmitting Heat
and Power.**

(Concluded from page 1.)

in the water can practically only be utilized
through a small range of the higher tem-
peratures, and much the greater part of the
heat must be rejected, though it may be re-
turned to the station at great cost and saved
if practical means are found for the pur-
pose.

The writer has thus far discussed the sub-
ject in the abstract without comparison with
other work. At this point it may be of in-
terest to state that precisely the feed-water
apparatus described above has been used
from the first in the plant of the New York
Steam Company designed by the writer, and
that we are barely able to condense the
steam which comes back in the returns when
half the feed water is supplied directly from
the Croton mains to make up the loss due to
the escape steam from high-pressure engines
supplied on the lines. At times a portion
of the steam from the pumping engines can
also be condensed in the tank, but at others
a portion of this escapes. It is utterly hope-
less to do better or even as well with a very
much larger proportion of hot water sup-
plied from the returns. If the present pro-
posed system, to return the water at high
pressure, be changed, then, without helping
the feed-water question, all the old compli-
cations of the former development of the
system will be necessary in every house, and
under some circumstances boilers would
necessarily be used on the premises arranged
to be heated by hot water instead of fuel.
On the other hand, if steam be used merely
the full range of temperature is available
for every operation, and the heat rejected
due to the smaller quantity of water re-
quired be readily returned to the station by
the surplus pressure in the pipes.

It will naturally be asked what the prob-
able cost of pumping the hot water will be.
This requires the assumption of a certain set
of conditions. Previous discussion has been
based on allowing the hot water a difference
of pressure at the two ends of the line of
twice that allowed to the steam between the
station and the point of use. On this basis,
with a comparatively low pumping pressure,
say a difference of 20 pounds between the
extremes of the line, the net power re-
quired for pumping would be somewhat
more than 1 per cent. for each volume of
water pumped compared with that required
to be pumped in the boiler for a steam sys-
tem. Reckoning the efficiency of steam
pumps at 50 per cent. on the basis of 1
horse-power for the heat required to evapo-
rate 30 pounds of water from 70 pounds
pressure per horse-power, there would
be required for circulating water for heat-
ing fully 11.4 per cent. of the
power transmitted through the pipes;
for power there would be required fully
20.4 per cent., and for cooking fully 145.4
per cent. Higher pumping pressures would
of course entail higher losses. For the
steam plant, on the contrary, there would
be required on the same basis for pumping
the water in the boiler, a little less than 2
per cent. of the power transmitted, and this
cost would be independent of the loss of
pressure in transmission. The water in the
returns would be forced back, as has been
stated, by surplus pressure. It will be seen
therefore that the water plant will not only
be more expensive to construct originally, as
well as more difficult to operate, but that
the actual cost of the operation would be
greater in the proportions stated, independ-
ent of many other considerations which can-
not here be discussed, which would make
the cost still greater on account of the in-
direct method of doing the work.

The resistance to explosion of the steam
and of the water-pipes could be made the
same originally by increasing the thickness
of the water-pipes proportionally to their
increased diameters; but if high capacities
were attempted by pumping water at very
high velocities the pipes would be rapidly
scoured out so as in time to become danger-
ously thin. In case of a break in the steam-
pipe the steam dissipates at once and is not
dangerous. The writer has known a case
where, through carelessness of workmen, a
man was struck full in the body at a dis-
tance of only a few feet by a jet steam 2
inches in diameter, issuing from a pipe at 80
pounds pressure, but no injury to his person
whatever resulted. Evidently, however, a
single quart of hot water, projected in the
same way, would have caused fearful
scalds, and anything like the same
quantity of water as of steam would
have caused a lingering death. Hot
water is also very destructive when the
pressure is suddenly released, and the flying
particles would scald persons and do other
injuries, even when projected long distances.
It is interesting to see all the operations of
cooking performed by hot water of high
temperature, but evidently every one of
those operations could be performed equally
well by steam with the pressure due to such
temperature, and all the operations would be
much more simple and economical. In other
words, the advantages due simply to high
pressure are claimed for hot water. It may
be said that the hot water at the high tem-
perature ought to be compared with steam
at the pressures ordinarily carried, but
the steam can be supplied at the high
pressure much more readily than the
water. There is, however, a separate
question as to the relative advantage
of transmitting steam, at the high pressure
of 25 pounds referred to above, compared
with a transmission at a pressure of 80 or 90
pounds corresponding to that ordinarily used
in practice. Evidently the lower pressure
will supply all the steam which is required
for heat and power purposes quite as well as
if generated at the very high pressure. The
only possible object in increasing the pres-
sure would be to do some kinds of cooking
which cannot be done with the lower
pressure, and it may be claimed to save
something in the size of pipes. So far as
the latter is concerned, the increased thick-
ness must also be taken into consideration.

insurance Company at the rate of \$10,000 per
lot, the transaction involving \$220,000.
The concern has lately been disposing of its
surplus country property, on which years
ago it loaned vast sums of money on houses
and acres far beyond the city limits and
which property has since fallen back on its
hands by foreclosure proceedings. The pro-
ceeds of such sales have been invested in
city lots and recovered as opportunity arises.

Astronomical Photography.

Stellar photography having become one of
the most important aids to astronomical re-
search, it was peculiarly fortunate that the
munificent bequest of Uriah Boyden to Har-
vard Observatory, for this very purpose,
came at so opportune a moment. The be-
quest, according to the Boston Transcript,
amounts to nearly a quarter of a million,
and was made mainly for this special work,
with the suggestion that some high point in
southern latitudes be selected as a site for
an experimental observatory. The task of
carrying out this enterprise was placed
under the immediate direction of Prof. E. C.
Pickering, who called to his assistance his
brother, W. H. Pickering. The latter
started for Colorado recently, accompanied
by his two assistants, Messrs. D. P. Bart-
lett and H. E. H. Clifford, and Professor
Pickering a few days ago started to join
them, to remain until the work is well under
way. The party is equipped with the most
complete and perfect apparatus obtainable.
Of course, the site of the new observatory is
not yet definitely decided upon, as there are
many conditions necessary to the pro-
secution of successful work in this par-
ticular branch, high altitude and a clear
atmosphere being the most essential. For
the present the headquarters of the party
will be at Colorado Springs, and it is not
improbable that some high peak in that
vicinity will be fixed upon. Great interest
in this important undertaking has been
manifested in this country and abroad, and
Professor Pickering has been in the receipt
of communications from the mountainous
portions of Europe, from the Cape of Good
Hope, and from South America, suggesting
positions for his work. All things consid-
ered, he, however, prefers some site nearer
home, if it should meet all the conditions.
Leading citizens and scientists of Colorado
have been profuse in their proffers of assist-
ance, and General Greeley, chief of the
Signal Service, has offered to co-operate in
the enterprise.

The instruments taken by Mr. W. H.
Pickering comprise a new telescope of 19-
inch aperture, made by Clark, of Cam-
bridge, with numerous appliances of new
design, mostly for photographic work, and
self-recording barometers and thermometers.
There is in process of manufacture a tele-
scope of 13-inch and another of 10-inch
dimensions, both being provided with photo-
graphic lenses. One of the unique appli-
ances of the expedition is in the 13-inch
telescope. The result of numerous confer-
ences between the users and the makers of
the instrument is that a modified or reversi-
ble lens has been introduced, so that the
same instrument can be used alternately for
visual and for photographic purposes. This
in itself may be reckoned a triumph already
achieved, which in the record must go to the
credit of this expedition. Though the Color-
ado Observatory is for the moment to be
classed as an experimental one, the real
"objective point," as the military men say,
being a permanent establishment south of
the equator, there are reasons to hope that it
will be taken up by the Colorado people in
the interest of science and made a fixture in
that State. The position geographically is
an important one. There is no first-class
observatory much nearer than 1000 miles.
The region is midway nearly between the
Lick Observatory on the Pacific and those of
St. Louis and Ann Arbor. The photo-
graphic plates will be returned to Cambridge
to be worked up for results and for publica-
tion in the annals of the Harvard College
Observatory. It is not probable that obser-
vations will be continued in Colorado after
cold weather begins, but the building and
apparatus will be so secured from the weather
as to be available in the early spring.

A Novel Suspension Foot Bridge.

As an instance of the practical work done
by amateurs in mechanics, the Scientific
American cites the case of a suspension
bridge at Oak Park, Ill. The bridge is very
light, and is intended solely for the use of
foot passengers, and it is suspended from a
large double elm tree on one side of the
river, while a tower has been erected as a
pier on the other bank, which is a rather
high bluff. The cables at this end, how-
ever, are carried to an oak tree, where they
are anchored at the ground. The bridge
was built by amateur mechanics, young
men just in their twenties. The bridge ex-
tends over the river Displines, with a span
of 125 feet in the clear. The distance from
the tree pier to the concrete anchorage is
75 feet clear, and the distance on the other
bank between the tower and the tree anchor
is 50 feet. The total length, therefore, is
over 225 feet. It weighs but 2750 pounds,
and has been tested by placing 15 men
thereon. There are four 3/4 inch cables,
but only two carry the load, the other two
forming an auxiliary support in case of
accident to the main cables. The passenger
way is narrow, the floor being about 3 or 4
feet wide, and passing directly between the
two trunks of the tree through which the
cables are passed. The height of the floor at
the tree is about 10 feet. The flooring is
built of planks 1 inch by 6 inches, laid 1 inch
apart, on account of snow, on longitudinal
stringers, 2 by 4 inches. These are sup-
ported by 1-inch gas pipe, hammered flat at
the ends. One half inch pipes are used at
the middle of the bridge. The bottom ends
are bolted to the stringers, and upper ends
are provided with small wooden blocks
clamped by two 3/4 inch bolts, and a space
being left in the blocks for the passage of
the cables. The bridge was built in the
winter time, in order that a scaffolding
could be erected on the ice on the river to
facilitate the construction. The bridge is
considered quite a curiosity, and many
thousands cross it every year.

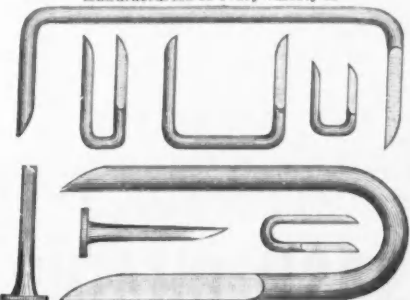
HALL & ELTON'S GERMAN SILVER.



In addition to Spoons of this well-known brand, we are now prepared to furnish Forks of the same quality. We GUARANTEE these goods to be SOLID and of UNIFORM quality throughout, with no coatings to wear through or flake off, and with no liability to RUST.

HALL, ELTON & CO., - - - WALLINGFORD, CONN.

FLORENCE TACK CO.,
P. O. BOX 39, FLORENCE, MASS.,
Manufacturers of every variety of



TACKS, SMALL NAILS, DOUBLE-POINTED TACKS AND STAPLES.

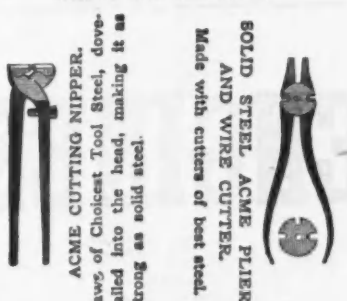
Our STEEL CLINCH STAPLES will drive in harder wood or mortar than when made from iron. They can also be clinched as well as any soft iron staples.

WILLIAM S. FEARING,

100 Chambers St., NEW YORK,
SELLS TO THE TRADE

Sheet Brass, Fancy Sheet Brass,
German Silver, Copper, Brass
and German Silver Wire,
Brazed and Seamless Brass and
Copper Tubes, Brass and Cop-
per Rods, Brass Ferrules,
Seamless Copper House Boilers,
Sheet and Ingot Copper, Spelter,
Tin, Antimony, Lead, &c.

ACME CUTTING TOOLS.
Made in all Sizes.



HIGGANUM HARDWARE CO.
HIGGANUM, CONN.

SHUBERT & COTTINGHAM,

MANUFACTURERS OF ALL KINDS

TACKLE BLOCKS.

Lignum-Vitæ and Iron Sheaves.

WITH

Plain, Roller and Self-Lubricating Bushings.

Heavy Purchase Blocks

FOR

Contractors, Builders, Railroad and Mining Use.

118 North Delaware Avenue,

Factory: Beach and Norris Sts.,

PHILADELPHIA, - - PA.

SEND FOR '87 CATALOGUE.

STAR * BRAND * TACKLE * BLOCKS,

For Railways, For Contractors, For Bridge Builders and General Trade.



We would particularly call attention to our Self-Adjusting Five Roll Roller Bush Blocks which for strength and durability cannot be equalled by any other make. These Roller Bushed Blocks give twice the purchase of the Iron Bushed Blocks, and are far more preferable to use on account of greater ease in hoisting. Try them and find out for yourselves. Call for the "Star Brand" SELF-ADJUSTING FIVE ROLL ROLLER BUSH BLOCKS.

BAGNALL & LOUD BLOCK CO.,

162 Commercial Street, Boston, Mass.

W. H. McMILLAN'S SON,

MANUFACTURER OF

Wrought Iron and Inside Iron Strapped

Tackle Blocks, Pumps, Mast Hoops, Hanks, Belaying Pins,

HAND SPIKES, HAND PUMPS, &c.

LIGNUMVITÆ WOOD A SPECIALTY.

113 South St., up stairs, Between Peck Slip and Beekman St., New York.
Factory: 32 and 40 Penn St., Brooklyn, E. D.



Sebastian May & Co.'s IMPROVED FOOT and LATHES POWER

Drill Presses, Shapers, Band, Circular and Scroll Saws, Machinists' Tools and Supplies. Lathes on trial. Catalogue mailed on application.
179 WEST SECOND STREET, CINCINNATI, O.

Latest Legal Decisions.

"BOYCOTTING" CRIMINAL CONSPIRACY.

Certain persons by threats, intimidation and violence prevented a manufacturing company from retaining their workmen, and from procuring other workmen, so that their work was seriously interrupted. The prosecuting attorney for the county caused these persons to be indicted for a criminal conspiracy, and the defendants demurred upon the ground that their acts constituted no offense against the law. In this case—State vs. Stewart and others—a formal judgment was entered against the defendants, who carried the judgment to the Supreme Court of Vermont, where the demurrer was overruled with leave to plead to the indictment. Judge Powers, in the opinion, said: "The principle upon which the cases—English and American, in this matter—proceed is that every man has the right to employ his talents, industry and capital as he pleases, free from the dictation of others; and if two or more persons combine to coerce his choice in this behalf it is a criminal conspiracy. The labor and skill of the workman, be it of high or low degree, the plant of the manufacturer, the equipment of the farmer, the investments of commerce, are all, in equal sense, property. If men, by overt acts of violence, destroy either of them they are guilty of crime. The anathemas of a secret order of men, combined for the purpose of controlling the industry of others by a species of intimidation which works upon the mind rather than the body, are quite as dangerous, and generally, altogether, more effective than acts of violence. And while such conspiracies may give to the individual directly affected by them a private right of action for damages, they, at the same time, lay a basis for an indictment on the ground that the State itself is directly concerned in the promotion of all legitimate industries and the development of all its resources, and owes the duty of protection to its citizens engaged in the exercise of their callings. The good order, peace and general prosperity of the State is directly involved in the question. In this case, the methods used are particularly set out. The defendants are charged with an intent to prevent the prosecution of the business of the Ryegate Granite Works, and with this intent have threatened O'Rourke, Goodfellow and others that they would denounce these works as 'scab shops,' and all workmen therein as 'scabs,' whose names would be published in the 'scab list' in the *Granite Cutters' Journal*, and that they would be shunned and not allowed to work with other granite cutters, and would be disgraced in the craft, by all of which intimidation these men, O'Rourke, Goodfellow and others were frightened and driven away from the shop of the works. The exposure of a legitimate business to the control of an association which can order away its employees and frighten away others that it may seek to employ, and thus be compelled to cease the further prosecution of its work, is a condition of things utterly at war with every principle of justice and with every safeguard of protection that citizens under our system of government are entitled to enjoy. The direct tendency of such intimidation is to establish over labor and over all industries a control that is unknown to the law, and that is exerted by a secret association of conspirators actuated solely by personal considerations, and whose plans, carried into execution, usually result in violence and the destruction of property. That evils exist in the relations of capital and labor, and that workmen have grievances that oftentimes call for relief, are facts which observing men cannot deny. With such questions we, as a court, have no function to discharge further than to say that the remedy cannot be found in the 'boycot.'

CHattel Mortgage of Foreign Corporation.

A foreign corporation made a mortgage of lands and personal property to secure their notes for \$14,569.05, and the mortgage was filed on record in the county where their lands and personal property were situated, and where the company at that time were doing business. The holders of the notes and mortgages fell into insolvency and made a general assignment. A number of small creditors of the corporation sued them, got judgment and levied execution on the personal property of the company. The assignee sued to foreclose the mortgage and the creditors of the company were made defendants because of the lien they claimed under the levy of their execution. The assignee was defeated and he carried the case—*Watson vs. Thompson Lumber Company*—to the Supreme Court of Arkansas, where it was affirmed. Judge Battle, in the opinion, said: "All mortgages of personal estate must be recorded in the county where the mortgagee resides. Now, as between the parties to the mortgage the instrument is binding, but as creditors and others who are entitled to notice it is not a valid mortgage, because the corporation have no residence in the county or in the State. Where is their residence? They must dwell in the place of their creation; they cannot migrate to another sovereignty. But although they must live and have their being in that State only, yet it does not follow by any means that their existence there will not be recognized in other places, and their residence in one State creates no inseparable objection to their power of contracting in another. They were not, as we have said, residents of this State, and therefore the notice of the mortgage by the filing was not binding on their creditors."

ASSIGNMENT FOR BENEFIT OF CREDITORS.

Under a general assignment, in Rhode Island, a secured creditor was paid nothing from the first dividend, but on the payment of the second dividend he was paid pro rata upon the balance of his claim after the security had been realized, and he was, also, paid such pro rata sum as for the first dividend. These payments were made under the authority of the *Knowles* case, 13, R. I., 90, but the creditor filed a bill in equity to compel the assignee to pay him out of any money he had in his hands, before making further payments to the other creditors, dividends upon his whole debt. In this

case—*Allen vs. Davidson*, assignee—the Supreme Court of Rhode Island gave the creditor his demand, overruling the *Knowles* case. The Chief Justice, Durfee, in the opinion, said: "In Pennsylvania, under a general assignment, a creditor by bond and mortgage was held entitled pro rata on his whole claim, though he had collected the greater part out of the mortgaged property, the amount collected and the dividend together being insufficient to satisfy the debt. He was not restricted to a dividend on his claims as reduced by the proceeds of the mortgage. The doctrine, thus declared, is that a general assignment creates a trust for the benefit of the creditors in proportion to their claim, respectively, as their claims exist when the trust is created, and accordingly that they are entitled to the benefits of the assignments in the same proportion so long as they continue to be creditors. The other creditors are protected by the rule that it is the duty of the assignee, if the secured debt is so reduced by the dividends that the security will more than pay it, to redeem for the benefit of the creditors."

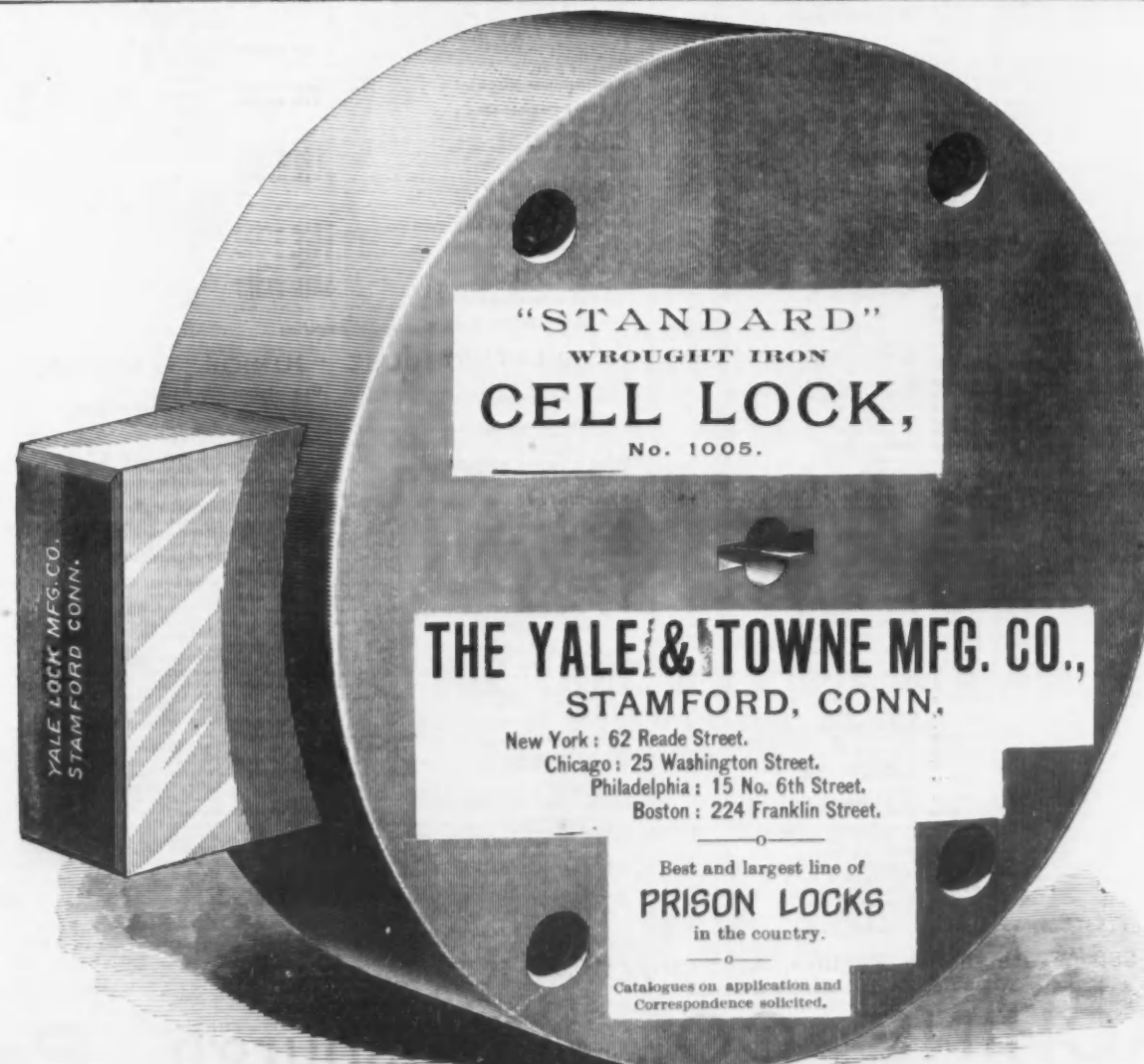
RIGHT TO STOP DELIVERY OF GOODS.

A merchant in Boston sold goods to a dealer in Maine, and he shipped them as directed by express, but before the goods reached him he went into insolvency, and a messenger of the insolvency court had his property in charge when the express company brought the goods to the store. The buyer refused to receive the goods, but the messenger accepted them from the carrier, paying it the charges on them. Before the assignee was appointed the seller demanded the goods from the messenger on the ground that he had the right to stop the goods in transit before they were actually delivered in this case, claiming that the messenger had as such interest in the merchandise that he could accept and hold them. The messenger refused to surrender the property, and suit was brought for them. The Supreme Court of Maine in deciding this case—*Tufts vs. Sylvester*—in favor of the merchant, by the chief justice, Peters, said: "The goods were seasonably stopped in transit to preserve the seller's lien on them. It is clear that the goods did not go into the buyer's possession. He refused to receive them. He had a moral and legal right to do so. Such an act is commended by jurists and judges. The question, then, turns upon the right of the messenger to accept the goods and terminate the lien of the seller. We do not find any authority for it. A bankrupt messenger acts in a passive capacity, is entrusted with no discretionary powers, acts under the mandate of the court, or does certain things particularly described by the law which creates the office; is worthy a keeper nor defender of property, a custodian until an assignee comes, and he can neither add too nor take from the bankrupt's estate. He is to take possession of the 'estate' of the insolvent. These goods had not become a part of the estate. He was not at liberty to affirm or to disaffirm any act of the insolvent. The law imposes upon him no such responsibility. Kent says the transit is not ended while the goods are in the hands of a carrier or middleman. A messenger has no greater authority than a middleman, unless the insolvency law expressly declares so."

On the 19th inst. the Union Steel Works, of Chicago, were the scene of another accident, which has been misrepresented in the daily papers. Two men, who were temporarily idle, sat down to rest near the end of the chute through which slag is discharged from the cupolas in which pig iron is melted for the steel works. While sitting there they fell asleep and did not hear the usual cry of warning by the workmen above them, who proceeded to dump the slag without noticing the sleepers. Both men were burned by the slag, one quite seriously, although not fatally. The coroner's inquest, which was held the previous day on the bodies of the victims of the accident on the 16th inst., exonerated the Union Steel Company from all blame for that catastrophe, finding that it resulted from the carelessness of the men, which was also clearly the case in the recent occurrence.

Messrs. John Wiley & Sons, of New York, the well-known publishers, have just issued a very interesting catalogue of practical works and text-books on civil, mechanical, mining, and marine engineering, &c. It contains full titles, brief outlines of the character of the works, and pre-s notices, and will be found a valuable assistant in the selection of recent engineering publications. It embraces 175 pages, and measures 5 1/4 x 9 inches.

A new roofing and corrugating company have been organized through the efforts of L. L. Sagendorph, of the Sagendorph Iron Roofing and Corrugating Company, Cincinnati. The organization, which have a paid-up capital of \$25,000, are located at St. Louis, Mo., and are to be known by the name of The Missouri Iron Roofing and Corrugating Company. The new concern are to manufacture roofing under the Sagendorph patents. Property has been purchased at the corner of South 2d and Barry streets, St. Louis, being a piece of ground 60 x 140 feet, on which stands a three-story brick building. This is to be fitted up with improved machinery, the contract for which has been let to George C. Keene & Co., of Cincinnati. The new concern expect to be ready for business before the 1st of August. The incorporators and stockholders are as follows: Charles Aldrich, president, Albany, N. Y.; B. N. Herndon, secretary, Covington, Ky.; William Diesterle, vice-president, Cincinnati, Ohio. The latter gentleman will also act as general superintendent. In addition to these the stockholders embrace C. N. Harder, of Philmont, N. Y.; C. N. Whittemore, of St. Louis, who is also treasurer of the company; L. L. Sagendorph, of Cincinnati, and Major H. P. Lloyd, of Cincinnati. The organization of this company makes the list of subordinate companies operating under the Sagendorph patents five in all, each having the same amount of capital. We understand that a sixth is in process of organization, to be located at Minneapolis, Minn.



"STANDARD"
WROUGHT IRON
CELL LOCK,
No. 1005.

THE YALE & TOWNE MFG. CO.,
STAMFORD, CONN.

New York: 62 Reade Street.
Chicago: 25 Washington Street.
Philadelphia: 15 No. 6th Street.
Boston: 224 Franklin Street.

Best and largest line of
PRISON LOCKS
in the country.

Catalogues on application and
Correspondence solicited.

H. D. SMITH & CO.,

Plantville, Conn.,

MANUFACTURERS OF THE

BEST QUALITY CARRIAGE MAKERS' HARDWARE,

Manufacture the Largest Variety of Forged Carriage Irons, of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

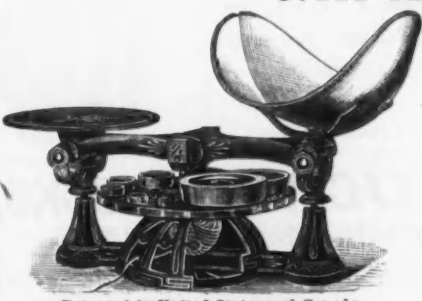
COVERT MANUFACTURING CO.



THE GREATEST EMPORIUM IN THE WORLD FOR THE BEST
SNAPS, CHAIN, ROPE and WEB GOODS, &c.
MANUFACTURED IN THE CELEBRATED WORKS OF THE
Covert Manufacturing Co.,
WEST TROY, N. Y.
by all jobbers handling this class of goods.

IXL COUNTER SCALE,

STEEL BEARING.



Patented in United States and Canada.

Holds the Weights and
Twine.

Weight Holder Revolves.

Full Line of Brass and Tin Seamless Scale Scoops.

SOUTHWARK SCALE COMPANY,

51 North 2d Street, - PHILADELPHIA, Pa.

Are you using

SASH CHAINS

MADE BY

"Thomas Morton"

65 Elizabeth St.,

New York?

If not, send and get prices



Manufacturers
Wood Engraving,
Electrotyping
and Printing.
Publisher of THE MANUFACTURERS' EXCHANGE.
A. MUGFORD, Hartford, Conn.

THE LOGIC OF FACTS!

LIST OF SALES WESTINGHOUSE ENGINES

FOR MARCH, APRIL, MAY AND JUNE, 1887.

WESTINGHOUSE STANDARD ENGINES.

Allegheny Co. Light Co.	11th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	12th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	13th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	14th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	15th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	16th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	17th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	18th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	19th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	20th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	21st order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	22nd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	23rd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	24th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	25th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	26th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	27th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	28th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	29th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	30th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	31st order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	32nd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	33rd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	34th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	35th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	36th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	37th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	38th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	39th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	40th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	41st order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	42nd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	43rd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	44th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	45th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	46th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	47th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	48th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	49th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	50th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	51st order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	52nd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	53rd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	54th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	55th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	56th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	57th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	58th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	59th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	60th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	61st order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	62nd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	63rd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	64th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	65th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	66th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	67th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	68th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	69th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	70th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	71st order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	72nd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	73rd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	74th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	75th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	76th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	77th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	78th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	79th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	80th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	81st order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	82nd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	83rd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	84th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	85th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	86th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	87th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	88th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	89th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	90th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	91st order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	92nd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	93rd order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	94th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	95th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	96th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	97th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	98th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	99th order	Pittsburgh, Pa.	300 H.P.
Allegheny Co. Light Co.	100th order	Pittsburgh, Pa.	300 H.P.

Old Dominion Electric Light & Power Co.	Richmond, Va.	45 H.P.
R. E. Jackson & Co.	Washington, D. C.	45 H.P.
Southern Cotton Oil Co.	Montgomery, Ala.	45 H.P.
"Artesian Well Encyclopedia"	Little Rock, Ark.	45 H.P.
Contains 700 engravings, illustrating and describing all the practical tools and appliances used in the art of Well Sinking, Diamond Drilling, etc.	Memphis, Tenn.	45 H.P.
We will send this book to any party on receipt of 25c. for mailing.	Atlanta, Ga.	45 H.P.
Expert Well Drillers and Agents Wanted.	Savannah, Ga.	45 H.P.
The American Well Works	Columbia, S. C.	45 H.P.
Aurora Ill. U. S. A.	Cincinnati, Ohio.	45 H.P.
Warren Schaff Asphalt Paving Co.	Salem, Dak.	45 H.P.
Salem Roller Mill Co.	Philadelphia, Pa.	45 H.P.
Electric Development Co.	Mexico, Mo.	45 H.P.
Baldwin Locomotive Works.	San Diego, Cal.	45 H.P.
Mexico Electric Light Co.	Oriskany, N. Y.	45 H.P.
Electric Development Co.	Milwaukee, Wis.	45 H.P.
H. Waterbury & Sons Co.	Portland, Me.	45 H.P.
Allegheny Co. Light Co.	St. Joseph, Mo.	45 H.P.
Carpenter & Underwood	Houston, Tex.	45 H.P.
Fraser & Chalmers	New Orleans, La.	45 H.P.
Southern Cotton Oil Co.	Little Rock, Ark.	45 H.P.
Colorado Electric Co.	Memphis, Tenn.	45 H.P.
N. E. Weston Electric Light Co.	New Orleans, La.	45 H.P.
Passaic Print Works	Boston, Mass.	45 H.P.
Fraser & Chalmers	Passaic, N. J.	45 H.P.
W. T. Melver	Chicago, Ill.	45 H.P.
Peoria Grape Sugar Co.	Rochester, Ill.	45 H.P.
Pennsylvania Rail Road	Peoria, Ill.	45 H.P.
Park & Ilford	Philadelphia, Pa.	45 H.P.
Jose Luis Requena & Co.	New York	45 H.P.
St. Joseph Union Depot	Colorado Springs, Col.	45 H.P.
R. V. Redfield & Sons	St. Joseph, Mo.	45 H.P.
Southern Cotton Oil Co.	New Haven, Ct.	45 H.P.
Pacific Canning Co.	Houston, Tex.	45 H.P.
Department City Water Works	New Orleans, La.	45 H.P.
J. L. Stadlerman	Little Rock, Ark.	45 H.P.
Pennsylvania Rail Road	Memphis, Tenn.	45 H.P.
N. W. Linsend Oil Co.	Savannah, Ga.	45 H.P.
Baltimore & Ohio Rail Road	Columbia, S. C.	45 H.P.
Isaac McRose & Sons	San Francisco, Cal.	45 H.P.
New Liverpool Salt Co.	Boston, Mass.	45 H.P.
U. S. Quartermaster's Dept.	Ardmore, Pa.	45 H.P.
Southern Cotton Oil Co.	Altoona, Pa.	45 H.P.
Decatur Chemical Works	Chicago, Ill.	45 H.P.
Asbury Barker	Wilmington, N. C.	45 H.P.
	Little Rock, Ark.	45 H.P.
	Memphis, Tenn.	45 H.P.
	Decatur, Ill.	45 H.P.
	Peekskill, N. Y.	45 H.P.

W. Jayne	New York	15 H.P.
United Gas Improvement Co.	Yonkers, N. Y.	15 H.P.
Taunton Button Co.	Tau ton, Mass.	15 H.P.
McNeil Pipe and Foundry Co.	Burlington, N. J.	15 H.P.
Allegheny Co. Light Co.	Pittsburgh, Pa.	15 H.P.
Manhattan Distilling Co.	Peoria, Ill.	15 H.P.
Southern Hotel	Chicago, Ill.	15 H.P.
John A. Brown	New York	15 H.P.
Scranton Corset Co.	Scranton, Pa.	15 H.P.
Atwood & Leach	Swanton, Vt.	15 H.P.
Pencoyd Iron Works	Pancoyd, Pa.	15 H.P.
A. R. Barry	Moscow, Russia.	15 H.P.
Westinghouse Electric Co.	Chicago, Ill.	15 H.P.
Electro Dynamic Co.	Wilmington, Del.	15 H.P.
Seipp Brewing Co.	Westchester, N. Y.	15 H.P.
Lawrence Machine Shop	Chicago, Ill.	15 H.P.
"Daily Union"	Lawrence, Mass.	15 H.P.
H. R. Koefoed & Co.	Copenhagen, Den.	15 H.P.
Charles J. Clark	Sciencetady, N. Y.	15 H.P.
National Gas Light and Fuel Co.	Chicago, Ill.	15 H.P.
West Side Brewing Co.	Chicago, Ill.	15 H.P.
Total, 195 Standard Engines, aggregating		9325 H. P.

WESTINGHOUSE "JUNIOR" ENGINES.

Pennsylvania R. R.	Pittsburgh, Pa.	35 H.P.
Great Western Cutter Co.	Grand Haven, Mich.	35 H.P.
H. D. Coleman	New Orleans, La.	35 H.P.
W. H. Plumb & Co.	No. Bangor, N. Y.	35 H.P.
Stiles & Parker Press Co.	Middletown, Conn.	35 H.P.
Standard Charcoal Co.	Goodrich, Tenn.	35 H.P.
Nashville Land and Improvement Co.	Nashville, Tenn.	35 H.P.
Thomas Woodruff	Detroit, Mich.	35 H.P.
Bouton & Co.	Greensboro, N. C.	35 H.P.
Spring Lake Iron Co.	Aurora, Ill.	35 H.P.
William Warren	Fruitport, Mich.	35 H.P.
Ashcroft Manufacturing Co.	Westfield, Mass.	35 H.P.
J. Luther Long	Bridgeport, Conn.	35 H.P.
H. W. Brown	Freeport, Pa.	35 H.P.
Bouton Foundry Co.	Clyde, Kan.	35 H.P.
Brand & Hardin	Chicago, Ill.	35 H.P.
Fairbanks & Co.	Saginaw, Mich.	35 H.P.
Plattner & Porter Mfg. Co.	Cincinnati, Ohio.	35 H.P.
Lincoln Canning Co.	Unionville, Conn.	35 H.P.
Carson City Elevator Co.	Lincoln, Neb.	35 H.P.
H. D. Coleman	Pewawee, Mich.	35 H.P.
South Pacific Milling Co.	New Orleans, La.	35 H.P.
Detroit Dry Dock Co.	Paso Robles, Cal.	35 H.P.
C. H. Furest	Detroit, Mich.	35 H.P.
W. H. Keller & Sons	Lille, France.	35 H.P.
Burlington Free Press	Saverton, Pa.	35 H.P.
Sparta Creamery Co.	Burlington, Vt.	35 H.P.
George R. Lombard & Co.	Morton, Conn.	35 H.P.
Frank Thorne	Lille, France.	35 H.P.
Q. W. C. A. Lane	Augusta, Ga.	35 H.P.
Laner & Bauman	Portland, Ore.	35 H.P.
F. C. Reed	Exeter, N. H.	35 H.P.
N. C. Foster	Detroit, Mich.	35 H.P.
	Honolulu, Pa.	35 H.P.
	Fairchild, Wis.	35 H.P.
Total, 42 "Junior" Engines, aggregating		1140 H. P.

Grand Total for Four Months:—238 Westinghouse Engines, Aggregating 10,665 H. P.

WESTINGHOUSE MACHINE CO., Pittsburgh, Pa.



TEAL'S
Portable Hoist,
Patented, April 8, 1884.
Advantages claimed.
1st. Being made with
Spur-Gears and at
the same time sus-
taining the load at
any point.
2d. One man of ordi-
nary strength is ca-
pable of raising the
load for which each
hoist is built.
3d. The ability of rap-
idly raising or
lowering the empty
hook by pulling on
the lift-chain, in-
stead of the slow and
tedious process by
the hand chain.
4th. Being provided
with self-oiling in-
-always lubricated,
which adds both to
the ease of lifting and
the life of the hoist.
TEAL HOIST COMPANY
(Limited), 148 Broad St.
(South from 235 Race) Philadelphia.

N. Y. Mallet & Handle Works,

Manufacturers of
Calipers, Carpenters', Stone
Cutters', Tin, Copper &
Boiler Makers'
MALLETS,
Hawking Beetsles, Haw-
king and Calking Irons
also all kinds of Handles,
Sledge, Chisel and Ham-
mer Handles.
ALSO
Cotton & Bale Hooks
Patented Feb. 13, 1877, a
new combination of
Hooks.
456 E. Houston Street,
NEW YORK CITY.

P. W. Gallaudet
Cor. Broadway and Wall St., New York.
Stocks and Bonds dealt in for cash or on margin at
New York Stock Exchange.

MACHINISTS' SCALES.
PATENT END GRADUATION.
Liberal Discount to the Trade. Send for List.

COFFIN & LEIGHTON, Syracuse, N. Y.

The Curtis Steam Trap.

Has automatic air discharge; has a differential open-
ing, thus discharging all the water as fast as it comes
in very accessible for cleaning, the valve being on the
outside. Send for circular. Manufactured by the
CURTIS REGULATOR CO.,
61 Beverly St., BOSTON, MASS.
GENERAL AGENCIES: 109 Liberty St., New York
66 N. 4th St., Philadelphia, Pa.; 108 Fifth Ave., Ch-
icago, Ill.; 210 So. 3rd St., Minneapolis 707 Market St.
St. Louis.

The "P. D. & Co." Patent EGG BEATER

BEATS
ONE EGG
IN A
TEA CUP
In 18 Seconds,
OR
SIX EGGS
IN A BOWL
In 70 Seconds.
Perfectly adapted for any shaped
dish.
Price Sample 30c. each, per
mail.

PAINE, DIEHL & CO., 12 Bank Street,
PHILADELPHIA, PA.

GENTLEMEN:
We hereby notify you that we are the
owners of the patents and rights under
which the "P. D. & Co." and similar Egg
Beaters are made. No one but ourselves
has any right to make Egg Beaters covered
by these patents, and we shall prosecute
any one infringing our rights.
All Beaters made by us have our mark,
"P. D. & Co." upon them.
Truly,

PAINE, DIEHL & CO.

STEAM ENGINES
Upright and Horizontal,
Stationary,
Portable and Semi-Portable.
8 to 16 Horse Power.
Illustrated Pamphlet Free. Address
JAMES LEFFEL & CO.
SPRINGFIELD, OHIO,
or 110 Liberty St., New York

D. J. WHITNEY,
HEADQUARTERS FOR

Sylvan Spring and Semper Idem
Solid Braided Sash Cord,

47 Warren Street, New York, N. Y.
The Best and Cheapest Goods in the Market.

NEW YORK BELTING & PACKING CO.

WAREHOUSE: 15 PARK ROW, NEW YORK.
THE OLDEST AND LARGEST MANUFACTURERS IN THE UNITED STATES OF
**VULCANIZED RUBBER IN EVERY FORM ADAPTED
TO MECHANICAL PURPOSES**

MACHINE BELTING
WITH SMOOTH METALLIC RUBBER SURFACE.
THIS COMPANY HAS MANUFACTURED THE LARGEST
BELTS MADE IN THE WORLD FOR THE PRINCIPAL
ELEVATORS AT CHICAGO, BUFFALO AND
NEW YORK.

STEAM AND WATER HOSE.
RUBBER TEST HOSE.
COTTON "CABLE" HOSE. CIRCULAR WOVEN, SEAMLESS,
ANTISEPTIC, FOR THE USE OF STEAM AND HAND FIRE
ENGINES, FORCE PUMPS, MILLS, FACTORIES, STEAM-
ERS AND BREWERS.

CAR SPRINGS OF A SUPERIOR
QUALITY
Original Solid Vulcanite Emery Wheels.

PATENT ELASTIC RUBBER BACK SQUARE PACKING.
BEST IN THE WORLD.
FOR PACKING THE PISTON RODS AND VALVE STEMS OF STEAM ENGINES AND PUMPS.

**CORRUGATED
RUBBER MATS AND MATTING.**
FOR HALLS, FLOORING, STONE & IRON STAIRWAYS, ETC.

JOHN H. CHEEVER, TREASURER.

BRANCHES: 308 Chestnut St., Phila. GOULDS & AUSTIN, 167 Lake St., Chicago.
52 Summer St., Boston. H. D. EDWARDS & CO., Detroit, Mich.
208 Nicollet Ave., Minneapolis, Minn. PERSICANER & CO., Pickhuben 5, Hamburg, Germany.

PAGE BELTING COMPANY,

SECTION OF COPPER WIRE-SEWED LIGHT DOUBLE BELTING.

We manufacture
ple and special grades
Also the "Hercules" Lacing
The Hercules is me-
recombines the good
and of Page's Pat-
Send for Catalogue
of Belting to use
CONCORD, N. H., U. S. A.

H. A. ROGERS,
No. 19 John St.,
NEW YORK,
RAILWAY AND MACHINISTS'
SUPPLIES.

Everything in the line. Write for what you
want. Sole agent in the U. S. for J. Moncrieff's
SCOTCH GAUGE GLASSES.
SOLE AGENTS FOR TANITE EMERY WHEELS

BUCK BROTHERS, MILLBURY, MASS.
The Most Complete Assortment in the U. S. of
Shank, Socket Firmer and Socket Framing Chisels.
PLANE IRONS.

CAUTION.—Buyers should be on their guard and not have inferior goods passed on them by unprincipled
persons who represent them as our make. Our tools are stamped "BUCK BROTHERS," and our labels have
on our trade-mark also, "Riverina Works."

VARIETY IRON WORKS. ALFRED C. REX & CO.
MAIN OFFICE AND FACTORY,
FRANKFORD, PHILADELPHIA.
BRANCH OFFICES,
PHILADELPHIA, 21 No. Fifth St.
NEW YORK 82 Chambers St.
CHICAGO, 89 Lake St.
SAN FRANCISCO, 109 California St.
MANUFACTURERS OF
Hardware Specialties
AND
Novelties in Iron, Brass
and Bronze.
Special attention paid to Electro-
plating in all its branches.

SAVE YOUR POWER!

Prevent your Belts from Slipping by using
The National Pulley Covering.
EASILY APPLIED, CHEAP, EFFECTIVE.
No Rivets; can be put on by any one. Satisfaction guaranteed.
Send for Circulars with Prices.

The National Pulley Covering Company.
Bowly's Wharf and Wood St., - - BALTIMORE, MD.

L. & I. J. WHITE, MANUFACTURERS
OF
Coopers', Carpenters' and Ship Tools, Plane Irons,
Cleavers, &c. Full Line Chisels.

BUFFALO, N. Y.

English Letter.

(From Our Regular Correspondent.)

LONDON, July 11, 1887.

THE WEEK

has been quiet in a general way, but there are reports of increasing firmness in several branches of the iron trade, and even of higher prices. In an ordinary way, as the quarterly meetings are to be held this week, this firmness might be taken to indicate advances in the quotations put forward at those gatherings. In this case, however, I fancy the symptoms are chiefly, if not entirely, due to the lessened output arising from the scarcity of water and the hot weather. I referred to both of these causes last week, and need only add that there have been welcome showers since in most parts of the country. These slight falls of rains have been very beneficial to the crops, but they have not been of sufficient weight to replenish the springs and streams, so that the iron and steel works have not gained any appreciable relief in that respect, while the temperature is still very high. Should these conditions continue, you may expect to hear of similar and perhaps more pronounced effects. I may say in this connection that the spell of heat has been more intense and of much longer duration than any similar spell for a great many years past.

The complaints of poor business or low prices are still as rife as ever on all sides, but I cannot avoid the conclusion that much of the grumbling rests on a very poor basis. It is certain at all events that there is pretty nearly or quite as much personal expenditure as ever there was. People go for their tours or seaside vacations just in the same old way, and it rests on reliable authority that the income tax returns steadily increase year by year. If there be any satisfactory explanation it is that business, although larger in the aggregate, is divided up among more firms and may not yield as high a percentage of profit as was formerly the case. For months past the Board of Trade returns, for instance, have shown an increasing volume of export business in iron and steel, yet during the whole period I cannot remember having heard any of the manufacturers I know admit that his business was other than limited and quite unsatisfactory. The doings of Mr. Andrew Carnegie, at Edinburgh, will no doubt have been fully cabled to your newspapers, consequently, I shall not waste space in referring to them in any detail here. I may just state, nevertheless, that the occasion was one of which all the parties concerned may well have been proud. It did honor to both the givers and the recipients of the honors bestowed. Mr. Carnegie's speech well expressed the innate love of the Scotchmen for his native land, while at the same time, he gave utterance to some exceedingly straightforward and plain democratic sentiments—that is to say, democratic in the sense of being republican.

SCOTCH FIG IRON
is not quite so strong, the statistics and all the features of the situation being eminently unfavorable to the views of the bulls. There are now 83 furnaces (12 hematite, 6 basic and 65 ordinary) at work in Scotland, as compared with 85 a year ago. In Connal's stores there are 895,077 tons (an addition of 3336 tons last week), as against 784,883 tons this date 1886. The shipments to July 2 are 11,771 tons in arrears (entirely coastwise), whereas the importations of Middlesboro' pig iron to Scotland are 17,562 tons ahead to the same date this year.

MIDDLESBORO' FIG IRON
is fairly steady, makers stating that they will not sell either far forward or under 35/7 ton. In this way they believe in their ability to weed out the speculators.

HEMATITE FIG IRON
is tolerably steady at about 43/6 @ 44/6 for mixed lots. There are now 52 furnaces at work, against 40 this date last year. Speigle eisen 20 % contents is 80/ f.o.b. Liverpool, usual terms.

IN THE METAL MARKET
something akin to disappointed expectancy has been the ruling feature in Scotland, where, at length, it is being acknowledged that the frequently expressed hopes of speedy improvement are not likely to be realized under existing conditions. The warrant market closed at 42/5 1/2 ton. In Cleveland the decrease announced in the make and stocks of the district has been welcomed, as judging from the small net decrease shown last month, it was feared that this month's returns would not be so favorable. Makers are as confident as ever in demanding 35/ for No. 3 G. M. B., and it is worth noticing that transactions at merchants' prices—viz., about 34/6—are neither numerous nor for large parcels. This may be due in a degree to the near approach of the quarterly meetings, which will be held next week; but, allowing for that point, makers maintain a firm position. The West Coast district has not developed any marked change, except that makers are rather firmer in the prices they are asking for special brands. Mixed numbers continue to be nominally quoted at about 44/ @ 45/. Shipments are fairly good, as makers have still on hand large orders for export. In Staffordshire the noticeable feature has been the threatened closing of works, owing to the drought. As a result prices have stiffened, and a little more vigor has been infused into this otherwise languid market. Also to the drought and to the excessive heat is mainly attributed the slight rise that has been experienced in the Black and Galvanized Sheet trade. Some makers announce an advance of 5/7 ton, but it is a question whether this figure can be taken as representing the normal state of affairs. At any rate, most, if not all, the works engaged in these branches are well booked at recent values. In bars, rods, hoops, angle-iron, tees, &c., there is hardly anything more doing than was reported a week or two ago. Certainly prices, beyond being firmer and more easily secured, have not advanced. Old rails and scrap occupy practically the position they did a week ago. Freights continue firm at 10/7 ton for pig iron from Glasgow to New York by ordinary steamer. Steel calls for little remark, as it continues to be in good demand, and the works are all

well employed. Blooms have been done at £3. 15/, but it is understood that makers are anxious for an additional 2/6 at least. Siemens-Martin billets are still nominally quoted 95/ @ 97/6 1/2 ton, f.o.b. Glasgow, and basic billets 75/ 1/2 ton, f.o.b. Glasgow. About 76/ @ 77/ are asked for basic billets, f.o.b. Middlesboro'. Steel sleepers are asked for by the Indian States. Steel rails have not been in great demand during the week. Several Transatlantic inquiries have been received, among them being one for about 5000 tons of 30-lb section for delivery at San Francisco, and about 6000 tons for the Mexican Central Railway. Whether these will lead to business is a moot point, but, if they do, great efforts will be made to keep the transaction as quiet as possible. The Northeastern Steel Company (Limited) have secured an order for 20,000 tons for the new Great Southern Railway of Spain. The delivery is to extend over a long period, so that the price secured is no criterion of present market values.

TIN PLATES.

The absence of rain is still causing many of the works much inconvenience, and this with the fact of most firms being well booked for a little time ahead has strengthened the market. The home demand for plates has shown an improvement, and the demand for export is pretty strong. I quote ordinary IC cokes 13/6, f.o.b. Liverpool. Wasters are 13/. At Liverpool there is not much change to report. Buyers are evidently holding off until a more convenient season for buying arrives. Prices have been pushed up too rapidly. Very little is doing in coke tin plates or Siemens steel plates with coke tinning, but there are a few orders for Bessemer steel coke tin plates, and some for charcoal tinned. The charcoal tin plate business is also quiet. At the same time quotations have been maintained very firmly on the whole. "Independence day" interfered for a couple of days with business, and then the nearness of the quarterly meetings caused buyers to ease off a little. Prices are merely nominal now—viz.: Coke tin plates, 13/3 @ 14/10; Bessemer steel cokes, 13/6 @ 14/3 IC; best coke tin plates, 14/3 @ 14/6 IC; Siemens steel cokes, 14/ @ 14/6 IC; charcoal tin plates, 15/ @ 16/6 IC; best charcoal tin plates, 16/6 @ 17/6 IC; Bessemer plates, 25/ @ 30/10; coke tin and Bessemer-steel coke wasters, 12/6 @ 13/.

THE HARDWARE TRADES.

In London, although there is only about an average turnover doing by general traders, yet a fairly hopeful spirit is abroad as to an improvement in business in the near future. The demand for engineering specialties shows very little, if any, improvement, and engineers are strong in their complaints of the all round depression in the various departments. Ship fittings and other marine goods are slow of sale. A fair business is doing in galvanized cisterns and tanks, but prices are very low. Paints, colors, lubricating and other oils are only in moderate request, and cheapness is still the order of the day. The demand for German tools, cutlery, and for English electroplate of the cheaper class is rather quiet, and prices are closely cut. There is about an average amount of business coming from Australia, South America and the Eastern markets, but complaints continue respecting prices. From the Eastern markets especially the limits at which orders may be placed are so low, and the rate of exchange is so uncertain and so unfavorable that many of the inquiries coming to hand cannot be placed. The South American markets are more encouraging and so also are the South African markets. At Birmingham shipping orders have been distributed pretty freely during the past few days, a large proportion of them being for galvanized shedding and hollow-ware, tubes, telegraph poles and railway material of various kinds for Australia and India. Continental requirements are improving. The home trade, though not so brisk as it was before the jubilee celebrations, continues good, more particularly in the agricultural districts which are stimulated by good harvest prospects and the seaside towns and places of holiday resort. The long drought has caused a large demand for hose-fittings and garden engines, and in connection with the volunteer encampments, mess tins, tent pegs and cooking utensils of various kinds are still in good request. The birding-gun trade, though still dull, is more active than it has been for some time past, though shipping orders continue to disappoint expectation. Notwithstanding the advance which has lately taken place in copper, tin, and to some extent in iron, prices of manufactured goods remain very low. At Sheffield conflicting accounts continue to be given of the general state of local industries, but it is clear that although there are exceptional instances of briskness, the lighter trades are less actively employed. Cutlery orders vary very much, and in some cases well-known houses are fully employed, while in many instances workmen are on short time. The railway and heavy industries continue to be actively employed, and tool-makers are enjoying a fair share of such business as is passing.

THE BOARD OF TRADE RETURNS

for June show that the imports of the month were £1,546,724 less than in the same month of last year. The exports were £17,320,441, or a decrease of £1,215,635. The quantity of iron and steel exported was 375,176 tons, worth £2,255,041, as against 335,124 tons, and £2,129,939 in June last year.

The chief lines of export to the United States were as under:

Article.	Month of June, 1887.	Month of June, 1886.	Month of May, 1887.
Alkali, cwt.	224,638	210,069	296,791
Hardware and cutlery	31,374	35,308	35,123
Iron—Pig, tons	44,235	36,637	36,788
Bar, angle, rod, &c., tons	136	151	171
Railroad, all, tons	11,681	3,254	10,987
Hoops, sheets, plates, &c., tons	1,066	5,326	3,599
Tin plates, tons	25,367	31,821	30,281
Cast or wrought, tons	201	97	184
Old, tons	11,577	2,505	16,900
Steel, unwrought, tons	24,083	4,518	14,899
Lead, all sorts, tons	60	92	84
Steam engines	7,132	3,381	3,781
Other machinery, &c.	41,962	43,722	41,937
Tin, unwrought, cwt.	206	223	212
Special return—Iron rails, tons			
Steel rails, tons	11,445	3,184	10,95

The Iron Age

AND METALLURGICAL REVIEW.

New York, Thursday, July 28, 1887.

DAVID WILLIAMS, - - - Publisher and Proprietor.
JAMES C. BAYLES and
CHAS. KIRCHHOFF, Jr., - Editors.
GEO. W. COPE, - - - Associate Editor, Chicago
RICHARD R. WILLIAMS, Hardware Editor.
JOHN S. KING, - - - Business Manager.

RATES OF SUBSCRIPTION

INCLUDING POSTAGE.

THE UNITED STATES AND BRITISH AMERICA.

Weekly Edition.....\$4.50 a year
Issued every THURSDAY morning.
Semi-Monthly Edition.....\$2.30 a year.
First and Third THURSDAYS of every month.
Monthly Edition.....\$1.15 a year.
Issued the First THURSDAY of every month.

ALL OTHER COUNTRIES,

PER ANNUM, POSTPAID.

Weekly Edition: \$5.00—£1—25 francs—20 marks
12 florins—6 roubles (coin)—25 lire—20 pesetas.
Semi-Monthly Edition: \$2.50—10/-—12½ francs
—10 marks—6 florins—3 roubles (coin)—12½ lire—
10 pesetas.
Monthly Edition: \$1.25—6/-—6½ francs—5 marks
—5 florins—1½ roubles (coin)—6½ lire—5 pesetas.

REMITTANCES

Should be made by draft, payable to the order of David Williams on any banking house in the United States or Europe; or, when a draft cannot be obtained, in postage stamps of any country.

NEWSDEALERS OR BOOKSELLERS

In any part of the world may obtain The Iron Age through The American News Company, New York, U. S. A.; The International News Company, New York, U. S. A.; and London, England; or The San Francisco News Company San Francisco, Cal., U. S. A.

RATES OF ADVERTISING:

ONE SQUARE (12 LINES, ONE INCH).

One insertion.....\$2.50 One Month.....\$7.50
Three Months.....15.00 Six Months.....25.00
One Year.....40.00

PAYABLE IN ADVANCE.

BRITISH AGENCY:

Office of The Ironmonger, 42 Cannon St., London

DAVID WILLIAMS,

PUBLISHER,

66 and 68 Duane Street, New York

PHILADELPHIA.....220 South Fourth Street
THOS. HOBSON, Manager.

PITTSBURGH.....77 Fourth Avenue
ROBERT A. WALKER, Manager.

CHICAGO.....95 & 97 Washington Street
J. K. HANES, Business Manager.

CINCINNATI.....Corner Fourth and Main Streets
HENRY SMITH, Manager.

CHATTANOOGA.....Ninth and Carter Streets
S. B. LOWE, Manager.

The Modern "Trust."

In a recent address before a graduating class of lawyers it was stated that formerly the cases before the courts involved human liberty and human rights, while in our day the rights of property were in question. We need not confine the statement to the courts of law; we find the same distinction running through our discussions and practices in political economy, in social science, and even in politics. We do not ask now whether a man should be put in prison without a trial, but how far is his wealth subject to direct public control, and in what manner should this supervision be exercised if we admit that it is necessary. Our fathers a generation ago thought they had averted the danger to public welfare inherent in corporations by making them fully amenable to law and by carefully defining their responsibilities. The very name "corporations" shows that it was intended to treat them as "bodies"—that is, as individuals, with such reasonable limitations as physical differences between individual men and different men organized to act as one man made necessary. Under these conditions the public has no present fear from incorporated industries.

How can a number of men obtain all the benefits of a close alliance and at the same time avoid the restraints which the law puts upon corporations? Much attention was given to this question, but only of late years has there been found any answer which had the elements of success. The Standard Oil "Trust" led the way, and now we hear of many attempts at imitation in various lines of manufacture and trade. The plan is simple. It is, as the name says, a trust—that is, the power and ownership of all the property involved is entrusted to two or more men, who are trustees. The owners of half a dozen mills, desiring to control production and prices, hold conference and agree upon a valuation for each piece of property concerned. The trustees chosen then issue to each owner a certificate that he is entitled to so many "shares" in equity of the property held by the trustees. The capital stock thus represented may be only the sum of the agreed valuations put upon the different mills, and these amounts are usually larger than the real values, or it

may include as much other water as it is supposed can be absorbed by investors. As there is no legal foundation for any of this misallied "stock," it follows that its amount is limited only by the prudence which will not spoil the scheme through such an over-issue as would frighten investors. For example, the shares of the Standard Oil Trust are quoted at 220, because none are for sale. Should they be put upon the market the price would rapidly decline.

In some recent lawsuits it was asserted that there is nothing in a trust of which the courts can take notice. Probably this is true. It has no legal existence, and is without a body. There is no legal objection to the giving away of different mills or properties to the same trustees on the part of any number of owners who wish to do so. There also seems no doubt, as long as the trustees are faithful to their trust, that production and prices can be thus more successfully regulated among the mills in combination than would be the case if they acted singly and with full power each over his own action, while the very elasticity of the agreement permits the absorption of competitors by the issue of further stock. A printing press is the only requirement. The fact that a trust has no legal existence has its favorable side. The trustees have control over the property, and if not responsible to the public neither are they to the shareholders except upon honor, and it would seem impossible to build up a permanent and enduring combination unless upon the foundation of legal title and responsibility as to ownership. All our experience teaches this, and yet in our changing commercial conditions we may rely too much upon it. Congress prohibited railway pooling because it thought it saw in the future such a gigantic pool of all our railways as would stifle all competition and leave our commerce entirely at the dictation of a few prominent managers; and this, too, in spite of the fact that no railroad could be compelled by law to join a pool, because other means of forcing an agreement could always be found. So in trusts; in spite of the lack of any legal means of compulsion these loose agreements might be able, through fear of consequences, to keep all members strictly bound to the conditions. These trusts present grave problems to the law-makers and political economists. Admitting that corporations as creatures of the State, they should be subject to control in order that their powers shall not be abused. How can supervision be exercised over combinations without the law, and which, as future development may show, need such supervision greatly?

Many things point to a certain change in public thought. It is no longer dishonorable to plan to render the statute law of no practical effect, though such law may be founded upon the clearest moral and social justice, and as such entitled to the support of every good citizen. We do not refer to the criminal classes, but to men whose integrity is unquestioned. Among lawyers the change of sentiment is most discernable. To defend any one charged with crime has always been legitimate, but it has been reserved for our day to make respectable the planning out of details before the crime which should free the perpetrator. The history of the Erie Railway is full of instances of such practices, while the recent trials of the New York "hoodlums" show reputable lawyers industriously engaged in nullifying the bribery laws without losing their standing at the bar. This lowering of the moral tone is also seen in mercantile life in the many schemes to obtain unfair advantages in business without subjecting the authors to any loss of neighborhood good opinion. It is upon this changed sentiment that the members of a trust somewhat rely for their success. It is only "smart" to form a combination which shall give those "on the ground floor" advantages which can only be obtained by questionable methods. Upon the morals of our business life we need such an awakening of public opinion as will condemn all attempts to make safe and justifiable the breaking of good laws, or indeed any laws. With such an arousing of the public conscience we can wait for the future development of trusts before venturing upon hard and fast legislation.

According to present reports the possibilities of pulverized coal are again receiving attention. Experiment, we are told, have been made at the Harrison Safety Boiler Works, at Philadelphia, Pa., with most gratifying results, a high efficiency having been secured from a low grade fuel. The process, as we understand it, is substantially the same as that of Messrs. Whelpley & Storer, which was made the subject of a series of Government trials a number of years ago, though in the present case it is intended, we believe, to use coal refuse only instead of good marketable coal, reduced to an impalpable powder by suitable machinery. The tests of the Whelpley & Storer process, so far as they went, showed that the use of powdered fuel was more expensive than that of lump coal, about in the ratio of the cost of pulverization, and so far the scheme was a failure. We should add here that the powdered coal was blown into the furnace by an air jet, and, according to the available accounts, the same arrangement is used in Philadelphia. Reliable test figures, however, have not yet been given, in the absence of which the value of the new process remains a matter for speculation.

The Right to Stop Strikes.

The interference with the business interests of large sections of the country by strikes of the workmen engaged in important branches of industry has become a chronic grievance. It seems to be an impossibility during these latter days to secure a condition of entire harmony in industrial matters. As soon as a costly and vexatious dispute involving untold annoyance to large numbers of persons, directly and indirectly, is settled, another serious trouble of a similar character springs up. And a very important feature of these labor controversies is that they are seldom wholly local in their effects. A freight handlers' strike in New York is felt to a very great extent by merchants 100 miles away, the shipment of whose goods is interfered with. A shoemakers' strike in Massachusetts or Eastern Pennsylvania is felt by numerous interests in other States engaged in supplying leather and shoe findings. A strike among the coke makers of a little strip of territory in Southwestern Pennsylvania extinguishes the fires of scores of blast furnaces of half-a-dozen States. With these primary consequences follow other results of a very serious character, thousands of workmen sometimes being thrown idle in industries that at first would not seem to be sufficiently connected with the strike-afflicted branch of trade to be specially troubled. Then, too, the business of merchants, transportation companies, and a thousand and one other dependent interests often suffers serious contraction from this cause, although the locality of the actual strike may be quite remote.

Arbitration is put forward as the great panacea, the universal remedy which will cover every case and cure every phase of this industrial disease. Unfortunately, however, the contending parties generally refuse to submit to arbitration until they have exhausted all measures customary in prosecuting such a contest. These considerations are inducing the growth of a strong sentiment in many quarters in favor of compulsory arbitration. Quite a number of the States have enacted laws providing for arbitration, but they are practically dependent upon the voluntary action of both employers and employed for their application. An appeal to arbitration by one of the parties to the controversy is of no effect if the other party refuses to submit to such a mode of settlement. In Massachusetts the State Board of Arbitration, it is true, is authorized to interfere in any strike involving the occupations of not less than 25 persons. It may summon witnesses, examine accounts and make a thorough investigation of the facts involved in the dispute. But if one or the other of the contending parties refuse to be bound by the decision of the board, how shall it be enforced?

This seems to be the rock on which compulsory arbitration must be wrecked. If striking workmen believe they have a just cause, whatever it may be, and a State board of arbitration steps in, hears the testimony of both sides and declares that the strikers must return to work upon the old terms, what force can be exerted of sufficient power to compel obedience? It goes without saying that an attempt to compel a man, by any power whatever, to work in a particular factory under regulations obnoxious to him or for wages he is not willing to accept, as fair compensation, would be such an interference with personal liberty as would cast a most profound shadow over the acts of tyranny protested against by our forefathers and to overthrow which they rebelled against the mother country. And, on the other hand, what power could compel the employer to throw open his works and provide employment for his force of workmen at wages which he could not afford to pay, if that should be the decision of a State Board of Arbitration? The preservation of his capital would make him risk the penalty that might be prescribed for non-compliance with such an order, and it requires no play of the imagination to believe that any magistrate before whom he might be brought would hesitate to pronounce judgment upon him. Such a law would work its own defeat.

What then can be done to avoid strikes? Nothing but the cultivation of a common bond of sympathy between the employer and his employees, together with the exercise of reasonable prudence in selecting a force of workmen, so as to shut out turbulent, intemperate and evil-disposed men. Legislation will not and cannot reach the root of the difficulty. Sober, industrious, well-disposed workmen, who feel that their employers are actuated by kindly feelings toward them, will usually be not only willing but anxious to talk over their differences with their employers in a friendly spirit, and to submit to arbitration when that is proposed as a way out of the trouble. This has been the experience of one of the largest industrial corporations in the West, and the experience of numbers of other employers of labor will confirm it. But if voluntary arbitration be rejected, compulsory arbitration offers no relief.

The official report issued last week of the recent gun trials on board the new cruiser Atlanta in Gardiner's Bay confirms some of the rumors which have been spread of the unsatisfactory character of the results. Captain Bunce, the commander of the Atlanta, reports having fired at a target one round with reduced charges and shell, and

one round with full charges and shell, from each gun. "The result of this firing," he says, "has been to completely disable both 8-inch B. L. gun carriages, and to throw doubt upon the efficiency of the 6 inch B. L. gun carriages, and the 3-pounder rapid fire gun mounts." The arrangement of the battery, moreover, proved to be bad, as some of the guns had to be abandoned by their crews, so that the other guns could be fired. A report is also given of a special board appointed to examine the hull and fittings of the ship after firing. This report shows in detail the extent of the damage, which consisted mainly in the disarrangement of electric light plant, driving in of panels, breakage of joiner-work and cabin windows and a slight splintering of the deck. While the reports certainly are not very favorable, they do not indicate so bad a state of affairs as some of the newspapers have attempted to portray. They have had the effect, however, of bringing about a suspension of work on the frigate Chicago and on the Boston. A change will be made in the models of the gun carriages, and heavier designs will be adopted.

Progress of a new British Colony.

On June 29 last the ninth semi-annual meeting of shareholders of the British North Borneo Company was held in London, on which occasion the chairman of the court of directors, Sir Rutherford Alcock, submitted his report for the calendar year 1886, during which time this latest British acquisition has made considerable headway. As it is evidently a colony of great promise, and may become of importance to American trade, we shall attempt a short description of the settlement and the progress it has made from the time a charter was extended to it, less than six years since. The territory under the jurisdiction of the British North Borneo Company (incorporated by Royal Charter under date November 1, 1881) comprises the whole of the Northern portion of the island of Borneo, from the Sipitong River on the west to the Sibuco River on the east coast, together with all the islands within a distance of 3 leagues, including those of Banguey and Balembagan. It is held under grants from the sultans of Brunei and Sulu, and contains an area of about 30,000 square miles, with a coast line of about 600 miles. The principal stations of the company are at Sandakan, on the east (where are also the headquarters of the administration), Kudat, on the north, Gaya and Mempakol (in Brunei Bay), on the west. At each of these there are excellent harbors, especially at the first named, which is situated in a magnificent bay some 15 miles in length, with an average breadth of 5 miles. There are several other good harbors and bays in the territory, and one has lately been discovered on the south side of Banguey Island, but has not yet been properly surveyed.

The greater part of the country is at present jungle, but the soil is found to be well adapted for the growth of almost all tropical products, more particularly tobacco, sugar, coffee, sago, tapioca, &c. Samples of the first have been well reported upon, and its cultivation is being gradually extended. The mineral resources of the country have not yet been fully investigated. Gold has been found in two or more of the rivers on the east coast; coal, copper, and other minerals have also been met with, but so far have not been worked. The exports comprise sago, tobacco, gutta percha, india rubber, rattans, beeswax, edible birds' nests, &c. A timber trade has been opened with both Australia and China. The revenue is derived from royalties on the various exports, a poll tax, licenses for the sale of opium, spirits and tobacco, and from the sale and rent of forest lands, suburban lots, and town sites. The company also issues their own notes, copper coinage, postage, and revenue stamps. Money orders on North Borneo are issued in England, and vice versa. The territory is administered by a court of directors in London, appointed under the Royal charter, and a governor, colonial secretary, and residents appointed by them.

The law of the country is based on the Indian Penal, Criminal Procedure and Civil Procedure codes, with an adaptation in special instances of several of the acts in force in the British colonies. Native courts are also established for the administration of Mohammedan law. There is a force of armed police under European officers. A European medical officer is attached to each residency. There is frequent communication by steamer with Singapore and Hong Kong, and occasionally visits are made by steamers running between Hong Kong and Australia. The authorized flags of the country are the British blue and red ensigns and Union Jack with a "lion," the company's badge. The appointment of the governor is subject to the approval of the Secretary of State. The revenue last year amounted to £23,732, being £4000 more than in 1885, the outlay to £32,623, or £2044 less than in 1885. In 1881 the income from the company's own resources was £3536; last year it amounted to £21,288. In 1881 the import of merchandise was \$160,658; in 1886 it reached \$849,175. The export did not exceed \$145,444 in 1881; last year \$524,734 worth of products were exported. Among unforeseen expenses there were the inundations early in 1886; a good deal of money was spent on

public works, especially roads leading to the rivers. The prospecting for minerals has also involved some expenditure; in return, gold was discovered in paying amounts last year in several rivers. Internal improvements to enable the settlers to maintain their ground on the estates leased them have furthermore been vigorously carried out.

The chairman remarked that some of the shareholders might look upon the results as to a certain extent discouraging, but the directors do not share these views, nor do the governor and other officers—all expressing confidence in the future of the colony and its further rapid growth. But of course, he added, to found a colony properly requires a heavy outlay; still the utmost economy has been observed, and some £2000 were in this manner saved last year. If we remember what the Straits Settlements were in the beginning, and what Hong Kong was, and that from a geographical point of view this new colony is as favorably situated as either of them, there is reason to believe that the British North Borneo Company's future will eventually be all those interested in it now hope, and that the youngest British colony will after awhile become comparatively as prosperous as the older ones, especially as there seems to be no lack of cheap field labor in the new settlement.

Mineral Products of the United States in 1886.

The following condensed statement of the mineral production of the United States in the calendar year 1886 is issued by the United States Geological Survey in advance of a report, "Mineral Resources of the United States, 1886," prepared by David T. Day, chief of the Division of Mining Statistics and Technology. Notably increased production and also an increase in value have been the general characteristics of the mineral industries during 1886. The total value of the mineral products increased from roundly \$428,000,000 in 1885 to \$465,000,000 in 1886. The important factor in this gain of \$37,000,000 was the increased production of pig iron from 4,044,525 long tons in 1885 to 5,683,329 long tons in 1886, and an appreciation of 75 cents in the average value per ton, making a total gain of \$30,483,360 in this industry alone. The condition of the individual industries is summarized below:

Iron.—The principal statistics for 1886 were: Domestic iron ore consumed, 10,000,000 long tons; value at mines, \$28,000,000. Imported iron ore consumed, 1,039,433 long tons; total iron ore consumed, 11,039,433 long tons. Pig iron made, 5,683,329 long tons, an increase of 1,638,803 tons as compared with 1885; value at furnace, \$95,195,760, or \$30,483,360 more than in 1885. Total spot value of all iron and steel in the first stage of manufacture, excluding all duplications, \$142,500,000, an increase of \$49,500,000 as compared with 1885.

Gold and Silver.—The total value of gold produced in 1886 was \$35,000,000, an increase of \$3,199,000 over 1885. The production of silver decreased from \$51,600,000 in 1885 to \$51,000,000 in 1886.

Copper.—The production in 1886, including 4,500,000 pounds from imported pyrites amounted to 160,678,081 pounds valued at \$16,469,503, a decrease of 10,284,526 pounds and \$1,823,496 in value from 1885. The average price of copper in 1886 declined to 10½ cents per pound. The copper sulphate made chiefly from ores and matte amounted to 13,400,000 pounds, valued at \$530,000 at 4 cents per pound.

Lead.—The total production increased to 335,629 tons in 1886, valued at \$12,667,749, at an average value of \$37 40 per short ton in New York. In 1885 the production was 129,412 tons, valued at \$10,469,431. The production of white lead in 1886 is estimated at 60,000 short tons, worth, at 6½ cents per pound, \$7,500,000. The total value of the oxides of lead was about \$1,335,000.

Zinc.—Production, 42,641 short tons; value, \$3,752,408, at \$88 per short ton—an increase of 1953 short tons and \$212,552 in value over 1885. There are preparations for a further increase during 1887. Zinc oxide (zinc white) was also made directly from ores, to the amount of 18,000 short tons, valued at \$1,140,000.

Quicksilver.—In 1886 the production in California was 29,981 flasks, or 2,291,547 pounds, valued at \$1,060,000. This is a decrease of 2992 flasks, but the total value shows an increase of \$80,811, due to an increase in price of \$3.50 per flask. Utah produced 87 flasks of quicksilver in addition to the above. The production of quicksilver vermilion increased to 700,000 pounds, and its value to \$392,000, owing to the increase in price of quicksilver.

Nickel.—The production includes 182,345 pounds metallic nickel, 60 tons of nickel and cobalt matte, 35 tons of exported ore, and 40,138 pounds of nickel ammonium sulphate; total value, \$125,157.

Cobalt.—In addition to 8689 pounds of cobalt oxide, at \$2 per pound, ore and matte were produced, making the total value, \$36,878.

Chromium.—Production of chrome iron ore decreasing. In 1886 about 2000 tons were sold, all from California, where its total value was \$30,000.

Manganese.—The production of manganese ores was 30,118 long tons, valued at \$277,527. In addition to this, 257,000 tons of iron ore, with from 2 to 4 per cent. of

manganese in the same, were produced, and 60,000 tons of manganiferous ores, containing from 4 to 20 per cent. of manganese that were used as fluxes in the silver region. The production of manganese ores in 1885 was 23,258 long tons, valued at \$190,281.

Tin.—Development work in the Black Hills resulted in the accumulation of considerable ore piles at the mines awaiting concentration.

Antimony.—Production, 35 tons metallic antimony, valued at \$7000. A small amount of sulphide of antimony was also sold for chemical manufacture.

Aluminum.—Aluminum bronze, containing 10 per cent. aluminum, was made to the extent of 50,000 pounds, valued at \$20,000 at 40 cents per pound. About 2500 pounds of iron alloy, containing 6 to 8 per cent. aluminum was also sold for \$7000.

Platinum and Iridium.—The production of platinum sand was only 50 ounces, valued at \$100. About 300 ounces of iridosmine for pen points were sold in 1886 for \$1000.

FUELS.

Coal.—The total production of all kinds of coal in 1886, exclusive of that consumed at the mines, known as colliery consumption, was 107,682,209 short tons, valued at \$147,112,755 at the mines. This may be divided into Pennsylvania anthracite, 36,696,475 short tons, or 32,764,710 long tons, valued at \$71,558,126; all other coals, including bituminous, brown coal, lignite and small lots of anthracite produced in Arkansas and Colorado, 70,985,734 short tons, valued at \$75,554,629. The colliery consumption at the individual mines varies from nothing to 8 per cent. of the total product, being greatest at special Pennsylvania anthracite mines, and lowest at those bituminous mines where the bed is nearly horizontal and where no steam power or ventilating furnaces are employed. The averages of the different States vary from 3 to 6 per cent.; the latter being the average in the Pennsylvania anthracite region. The total production including colliery consumption was: Pennsylvania anthracite, 34,853,077 long, or 39,035,446 short tons; all other coals 73,707,957 short tons, making the total absolute production of all coals in the United States, 112,743,403 short tons, valued as follows: Anthracite, \$76,119,120; bituminous, \$78,481,056; total value, \$154,600,176. The total production of Pennsylvania anthracite, including colliery consumption, was 699,473 short tons in excess of that produced in 1885, but its value was \$552,828 less. The total production of bituminous coal was 1,086,403 short tons greater than in 1885, while its value was \$3,866,592 less. The total production of all kinds of coal shows a net gain of 1,785,881 short tons compared with 1885, but a loss in spot value of \$4,419,420.

Coke.—The total production of coke in 1886 was 6,835,068 short tons, valued at the ovens at \$11,552,781. This is the largest production ever reached in the United States, the nearest approach to it being in 1883, when 5,464,721 tons were made. This declined in 1884 to 4,873,805 tons. The year 1885 showed a gain upon 1884, the total being 5,106,696 tons. The production for 1886 shows a gain on that of 1885 of 1,728,372 tons, or nearly 34 per cent. The total increase in value was \$3,923,663. The production of 1886 is 1,370,347 tons, or 25 per cent. greater than the maximum of previous years.

Petroleum.—The total production was 28,110,115 barrels of 42 gallons each, of which the Pennsylvania and New York fields produced 25,798,000 barrels. The total value at an average of 71 1/2 cents, the average value of the Pennsylvania and New York petroleum was \$20,028,457. The production showed an increase of 6,268,074 barrels over the production of 1885.

Natural Gas.—No record is kept of the yield in cubic feet. It is estimated that the amount of coal displaced by gas in 1886 was 6,353,000 tons, valued at \$9,847,150. In 1885 the amount of coal displaced by gas was 3,161,600 tons, valued at \$4,854,200.

Building Stone.—Value estimated to be about the same as in 1885, \$19,000,000.

Brick and Tile.—Value \$38,500,000; this value represents an increase of 10 per cent. over last year. The increase in production was slightly greater than 10 per cent.; there was some falling off in value during a part of the year.

Lime.—The production is estimated at 42,500,000 barrels, with an average value of 5 cents per barrel.

Cement.—Production of cement from natural rock was 4,350,000 barrels, valued at \$3,697,500. Artificial Portland cement, 150,000 barrels, valued at \$292,500. The total production of cement of all kinds was 4,500,000 barrels, valued at \$3,990,000.

Buhrstones.—The total value of the finished buhrstones was \$275,000. The increased use of roller mills affected the French buhrstones more than domestic stones.

Grindstones.—Total value \$2,500,000; produced mainly in Ohio and Michigan.

Corundum.—The production in the past few years has been quite steady; in 1886 it was 645 short tons, valued at \$116,190.

Novaculite.—The rough whetstones amounted to 1,160,000 pounds valued at \$15,000. The value of the stones is greatly increased by cutting.

Infusorial earth.—The production for the year amounted to 1200 short tons, with a spot value of \$6000; all from Maryland.

Flint.—About 30,000 long tons, having a spot value of \$120,000, were used in pottery

manufacture, besides a considerable amount for sandpaper.

Precious stones.—The value of the rough gems sold in 1886 was \$79,056. In addition, gold quartz was sold for specimens and for gems to the value of \$40,000. The value of this, when cut, is \$100,000.

Phosphate rock.—Total production was 430,549 long tons, all from South Carolina, except experimental lots from Alabama, Mississippi and Florida. The total value was \$1,872,936. The production decreased 7307 long tons and the value \$973,128 from 1885.

Martite.—The main production is from New Jersey and is comparatively steady at 800,000 short tons, valued at \$400,000. Considerable local use is also made of many small deposits in North and South Carolina, Alabama, Mississippi and Florida.

Salt.—The total production increased from 7,038,653 barrels (of 280 pounds each) in 1885 to 7,707,081 barrels in 1886. The total value, however, decreased slightly. In 1886 it was \$4,736,585, and in 1885 \$4,825,345.

Bromine.—Both the production and the average price of bromine increased markedly in 1886. The total production was 428,334 pounds in 1886 and 310,000 in 1885. The total value in 1886 was \$141,350 and in 1885 \$89,900.

Phosphorus.—Production, 30,000 pounds, valued at \$20,000.

Borax.—Production, 9,778,290 pounds, all from California and Nevada. Total value, \$488,915 at 5 cents per pound for concentrated.

Sulphur.—The production amounted to 2500 short tons, valued at \$75,000.

Pyrites.—About 55,000 long tons were produced, valued at \$247,500 at \$4.50 per long ton at the mines. In addition, 57,000 tons were imported.

Barytes.—Estimated production, 10,000 short tons of crude, valued at \$50,000.

Gypsum.—Estimated total production of crude gypsum was 95,250 short tons, valued at \$428,625. From this, 50,000 short tons of land plaster and 26,000 short tons of calcined plaster were made. In addition, 122,270 tons of crude gypsum were imported, chiefly from Nova Scotia.

Mica.—The production decreased to 40,000 pounds, valued at \$70,000. This is exclusive of 1000 tons of waste, valued at \$10,000.

Feldspar.—Production, 14,900 long tons, valued at \$74,500 at \$5 per ton for the crude material without being ground. This is an increase of 1300 long tons over 1885. The price has remained constant.

Asbestos.—The domestic production was about 200 short tons, valued at \$30 per ton at the mines. The production is decreasing, owing to importation of a better quality from Canada.

Asphaltum.—The production increased to 3500 tons, valued at \$14,000, at the deposits in California. In 1885 the value was \$10,500.

Ocher.—Production, including metallic paint, umber and sienna, 15,800 short tons, valued at \$285,000.

Graphite.—The production in 1886 was 415,525 pounds, valued at \$33,242. In 1885 the production was 327,883 pounds, valued at \$26,230. The price remained constant at 8 cents per pound. This is exclusive of 500 tons of impure graphite mined at Cranston, Rhode Island, for metallurgical purposes.

Alum.—Production, 90,000,000 pounds, valued at \$1,350,000. About three-fourths are made from imported cryolite, beaumontite, aluminous shale and other raw material.

Copperas.—Production, 22,000,000 pounds, or 11,000 short tons. Value, at 50 cents per cwt., \$110,000.

Fluorspar.—The annual production for the past three years has been about 5000 tons, valued at the mines in Indiana at \$4.50 per ton, or \$22,500 in all.

Rutile.—Production for coloring artificial teeth about 600 pounds, valued at \$2000.

Mineral waters.—Considering only the amount sold, the production was 8,950,317 gallons, valued at \$1,284,070. This shows a slight total decrease since 1885. This may be only apparent. If all the springs had reported the figures would probably have shown a total increase, although some large springs undoubtedly sold less.

Lithographic stones.—Considerable effort is being made to develop the industry in Tennessee. About 50 tons have been taken out and dressed. The use of the stones has proved quite satisfactory and will probably increase.

Magnesite.—Heretofore the raw materials for making magnesium compounds have been imported, chiefly from Germany. The annual imports of magnesite vary from 100,000 to 2,000,000 pounds. In 1886 the production of magnesite was begun on Cedar Mountain, Alameda County, Cal.; the product, amounting to several tons, was shipped to New York.

The repeating rifle of the German army differs from the ordinary rifle in the fact that the stock, instead of stopping short where it is grasped by the left hand, is prolonged to within an inch of the end of the barrel. This constitutes the reservoir of the magazine. The firing consists of three movements—the "ready," during which each man gives a sharp turn to the right to a lever above the lock of his gun, and the familiar "present" and "fire." The company stand four deep, the two front ranks

firing while the two rear ranks re-charge their magazines. So rapid are the movements that the magazine is emptied, with a perceptible allowance each time for rapid aim, in ten seconds.

The Resistance Torpedo Experiments.

The much-talked of torpedo experiments in England, which were commenced last year, and have been suspended since November, were resumed a few weeks ago at Portsmouth. It will perhaps be remembered from the account which we gave at the time that the earlier trials yielded no conclusive results, repeated explosions having failed to entail disastrous consequences to the Resistance, the vessel selected for experiment, and the latter, moreover, was an iron-clad of obsolete type, making definite conclusions as to what would have been the behavior of the modern war-ship under the same circumstances somewhat hazardous. Since the last experiments were carried out against her, however, measures have been taken to make her as far as possible the counterpart, so far as under-water arrangements and coal protection are concerned, of a modern ship of war. At the last attack the Whitehead was directed against the after part of the hull on the port side in wake of the boilers. During the present series of experiments the old ship was assailed on the same side, but directly amidships, in the neighborhood of the engine-room. As no steam was got up in the boilers, the effect of the jar upon the steam pipes, glands and feed connections remains a matter of speculation. So far as the consequences of the burst upon the structure of the hull itself is concerned, every care was taken to make the ordeal as complete and instructive as possible. The wing passage, which has a maximum diameter of 3 feet diminishing to a point, was left empty, although at the former experiments the lower portions were filled with coal. But behind this, and at a distance of 8 feet from the bulkhead, a longitudinal or fore and aft steel bulkhead 3/4 inch thick had been worked to a length of 61 feet, and with the coal with which the intervening compartment was packed, formed (as in recent armorclads) a solid rampart, 20 feet high, for the defence of the engine-room. The height of the double bottom between the outer and inner skin plating is 2 1/2 feet. The watertight compartments were divided into stations by means of vertical lightning plates pierced by three holes, and in order to make them, as far as was practicable, resemble the bracket frames of a modern armorclad, the center of the plates was cut away so as to leave a single oval hole instead of the three circular holes. In view of the differences of opinion which exist on the part of experts on the subject of under water protection, it was determined to submit the problem to the test of experiment. For this purpose steel armor 1 1/2 inch thick had been worked along the outside of the upper skin of the double bottom throughout one of the compartments, in addition to the other protection mentioned. The Resistance had been brought down by iron ballast to a trim of 25 feet 9 inches aft and 19 feet 7 inches forward, giving a mean draft of 22 feet 8 inches. She was consequently rather further down by the stern than before, but was in other respects the same. When in commission, the Resistance had a mean draft of 26 feet 10 inches. The present series of experiments was of even greater importance than the first series. The attack was gradually developed by means of fixed and out-rigger charges of increasing power.

The opening experiment on June 9 consisted of an attack directed against a new system of torpedo defenses which are to be carried by ships in action, or when in expectation of an attack, rather than an assault upon the ship herself. The previous experiments had clearly demonstrated that a Whitehead, when projected against a vessel at close range, and consequently with a maximum of motive force, could not get through the ordinary wire netting before expending its explosive energy in the air, and that the spars by which the nets are boomed out from the ship's side could be reduced to 25 feet in length without danger to the hull. The ordinary wooden booms employed on board ship, however, are heavy and unwieldy, weighing, as they do, more than 1/2 ton each. In ordinary circumstances, the spars cannot be lowered into place and the nets made taut in less than a couple of hours, and the work of stowing them is equally slow and laborious. Steel booms were therefore substituted for the wooden booms, and an arrangement of pulleys and runners was adopted, by which the protection can be run out and in, topped and brailled up out of the way with great facility. The booms were 32 feet long and spaced 45 feet apart, and connected by a jackstay, to which the nets were attached. The first torpedo was discharged at an approximate range of 50 yards. The missile was one of the old 16-inch pattern, but it was understood that the charge of gun-cotton had been reduced to 87 pounds, so that the net protection should not bear a greater strain than would be the case in actual hostilities. The torpedo, which was set to a depth of about 10 feet, struck the net in the middle and threw up an immense spout of water, but without getting to the ship, which was apparently uninjured. Although it hit the net immediately below the centre boom, no fracture occurred, and the points remained intact. Although at the short range the torpedo would spin through the water at from 30 to 40 horsepower, and would deliver a formidable blow upon the net, the thrust was effectually resisted, though, as a matter of course, the net was much torn by the explosion.

Although at the second torpedo attack made on the Resistance the following day the offensive power that was brought to bear was quite exceptional, the victory remained with the ship. The charge exploded was an exceptionally heavy one. It consisted of 220 pounds of gun cotton. It was consequently more destructive than any which is ever likely to be launched against an armorclad much better prepared to resist it than the obsolete and time-worn Resistance. The

steel booms and runners, which were found to be scarcely anything the worse from the ordeal of the previous day, were again used. The damaged net was taken away and one of the old service grummet nets slung in its place, the cylinders containing the gun cotton being attached to the jackstay immediately in front of the battered sides and 30 feet from the hull, and sunk to a distance of 20 feet below the water line, which would bring it about opposite the end of the bilge. The charge was electrically fired from a pinnace. The burst was terrific. But the remarkable thing was that the hull did not appear to jump in the least, although there was not more than 6 feet of water under her keel. That she would not be seriously crippled by the discharge seems to have been accepted as a foregone conclusion, as the day for the third experiment had been fixed in advance, but that the steel booms with their double-flange running ways, stays, travelers, and hinges should have resisted the tremendous jar and upheaval was a genuine surprise for all concerned, and goes far to prove that except a vessel be taken unawares it will be impossible for a torpedo to come into actual contact with it. At the experiments last year the wooden booms were unhinged and splintered under a much less violent shock. But the steel booms employed, though somewhat bent, remained unbroken and in position, and the joints were quite uninjured. All that is necessary for perfect defense is that the booms should be made a little heavier.

The experiments were resumed on June 13, when the old ironclad suffered some rough treatment. Ninety-five pounds of gun cotton were exploded 20 feet below the water, and in contact with her double bottom. The amount of explosive represents the full charge of the old 16-inch Whitehead, but as the hull was for prudential reasons moored close to a mud-bank, and as the water was consequently much too shallow to allow of a locomotive torpedo being set to run at the required depth, a fixed charge was lashed fore and aft against the bottom plating of the ship and electrically exploded. In previous experiments this year the ironclad was attacked on the port side, which had been specially strengthened for the occasion, and the result was a victory for the defense. On June 13 the starboard side was selected for attack, in order that a comparison might be instituted with the effect produced under different conditions by a similar experiment. Last year in the latter case the double bottom was filled with coal, and after the charge, which was lashed against the ship in the same way, had been exploded, it was found that the bilge keel had been shivered for a length of 20 feet, while the lower plating had been much bulged above the bilge keel. Four strakes of the skin plating extending up to the armor shelf had also been forced inward and fractured where they crossed the longitudinal frames. They had parted in the middle for a distance of 8 feet, while some of the butts had been opened so that gashes 2 inches or 3 inches wide appeared between them. The coal had been pulverized and scattered in all directions, and other internal damage inflicted. Nevertheless, the watertight bulkheads remained intact, and by confining the influx of water to a single compartment so much buoyancy was preserved that, though the ship heeled over to starboard and was maimed, she remained afloat, and might have continued to fight her guns, provided always that no injury had been sustained by her machinery, a point which these experiments do not touch. Crippled, however, as she was, it was thought at the time (and the probability was strengthened by subsequent examination of the ship in dock) that the coal, instead of being a protection to the double bottom, had in reality proved a source of weakness by receiving the energy of the explosion from the outer plating and communicating it to the inner plating, and so distributing it throughout the submerged portions of the hull.

The question was sufficiently important to demand an experimental solution; hence the present demonstration. The double bottom, which is about 2 1/2 feet deep, was consequently kept empty, and the torpedo placed in immediate contact with it in such a manner that, being overhung by the contour of the hull, the ship would feel the full force of the upward as well as the lateral energy of the charge. The charge was fired in the wake of the boilers, and it was soon perceived that something of a fatal character had taken place from the appearance of coal dust sweeping up through the hold. The report had not the dull boom to which the spectators had become accustomed. Instead of this, the gun-cotton exploded with a sharp, angry, whistling noise, while the manner in which the mud was churned up showed that the force of the rebound was terrific. The ship lifted bodily near the stern, after which it was seen to leisurely heel over to starboard some 8 or 10 degrees, and finally repose, though not until the tide fell, upon the mud. The old hull had been mortally wounded at last. A complete knowledge of the disaster which has overtaken her will not be obtained until a careful investigation has been made of the hull in dock. But, from a hasty exploration which was conducted on board, it was evident that the shot had not only dislocated the inner plating of the double bottom, but had penetrated the bunker compartment, stored as it was with coal, that the watertight doors and compartments had ceased to operate, and that water was flowing into the hull through a hundred crevices. To such an extent was this the case, that, though a strong working party was at hand ready for any emergency, it was deemed useless to attempt to free the ship of water until her gashes had been temporarily closed from outside. When this has been done, she will be pumped out and brought into dock for careful examination. From what has been said, it will be seen that while the explosion of 95 pounds of gun-cotton in actual contact last November simply crippled the Resistance, the explosion of a like charge at the same spot, and under approximately the same conditions, has, in this instance, not simply disabled, but really sunk the ship. For the particulars of the trials we are indebted to the London Times, in which a very complete account was given.

Raising a Sunken Ship.

In view of the recent successful raising of the British steamer Wellesley City, which had been sunk by collision in the Hudson River early in the year, the following account of an entirely similar operation given in *Engineering*, London, will prove interesting:

It will be remembered that at the end of last February the Locksley Hall, a large ship that had just arrived in the Mersey from San Francisco, was sunk in that river by falling across the bows of a steamer at anchor. Since that time until a few days ago the sunken ship has proved a source of obstruction to the navigation and danger to passing craft. The Mersey Dock and Harbor Board had determined to lift the vessel up, but to this the Mersey Railway people objected, and the wreck was in such close proximity to the tunnel that there was danger of it being injured. Under these circumstances the Dock Board advertised for tenders to lift the ship, but for some time without result, until a syndicate was formed in London by Messrs. Bullivant, the wire rope makers; Messrs. Fletcher, the well-known engineers and ship repairers, of Limehouse, and Messrs. Rennie. This combination undertook to lift the ship and carry it into shallow water for the sum of £15,000. The dead weight of the Locksley Hall is set down at 1000 tons, and she had on board, when sunk, cargo to the extent of 1400 tons. Some of the latter had been lifted, but on the other hand it was estimated that this had been more than compensated by the silt that had drifted in, so that the weight to be raised was put down at 1800 tons. The first step of the adventurers, on the contract being signed, were to set about making the cables and to purchase four lifting hulks. The latter were represented by the Constitution, Resolute, Odin and Ocean Child. These were capable of raising 500 tons each, so that there was but 200 tons left as a margin of safety; a factor, however, which has necessarily often very modest proportions in wrecking operations.

The two first-named vessels are of iron, while the latter are of wood. The ropes consisted of flexible steel wire 9-inch and 7-inch ropes. The latter were made into strops of various lengths from 2 to 20 fathoms, in order to facilitate the operations by giving greater ease in handling. The 9-inch ropes are made up of six strands, each strand in turn consisting of 37 steel wires, the metal having a tensile strength of about 100 tons to the square inch. There is, of course, a hemp core. The main lifting ropes were passed round the wreck, having been placed in position by divers and sea-sawed into the required spot under the hull by means of tugs. The hulks were strengthened in all directions by massive internal timbers so as to withstand the nip that would be brought on them when the wreck began to lift with the rising tide. The eight of the main lifting ropes being passed under the wreck, they were hitched over the hulks by means of the strops, the latter being turned back and secured to themselves by clamps specially designed for the purpose. The outside of the hulks were protected by wood packing faced with iron. On Monday, the 14th inst., the first lift was made. At low water the deck of the Locksley Hall was about 9 feet below the surface. In spite of one or two minor mishaps, the hulks, in rising with the flood, carried the wreck clear of the rocky bottom on which she reposed, and guided by a couple of tugs, the whole flotilla was carried into shallow water. The success of the operation was to a great extent insured, and the final lift was to be made on Tuesday last. The whole work was carried out within about six weeks of the signing of the contract, which was half the specified time.

A Canal Connecting Two Seas.

The project of connecting the Mediterranean Sea and the Bay of Biscay by means of a canal traversing the South of France, has often been under discussion. Without entering into the political considerations set forth in a pamphlet just published by M. E. Couillard, the *Annales Industrielles* points out certain advantages to France to be obtained by the realization of such a scheme. In the case of a maritime war, the Strait of Gibraltar could be avoided; Brest and Toulon would be rapidly brought into prominence; the concentration of troops would be effected more easily; and the prestige of England considerably lessened. From an industrial and commercial point of view, the canal between the two seas would shorten by several days the distance between the English ports, the North Sea and the eastern basin of the Mediterranean, and the extreme East. The dues levied upon the ships passing through the canal would be amply compensated for by this economy of time and the security gained by avoiding the stormy coasts of Spain and Portugal during the winter months. The ports of Bordeaux and Marseilles would also gain considerable importance, and the increase of traffic that would ensue on the principal lines would greatly profit the railway companies. The most rational route would be from Bordeaux to Cette by Agen, Montauban, Toulouse, Carcassonne, and Béziers. From Bordeaux the canal would generally follow the course of the Garonne, passing on its right bank; it would tap the Dorpt, the Lot, the Aveyron, and the Tarn, and either draw its supplies direct from their waters, or through the creation of vast reservoirs. After passing Toulouse, it would run the course of the South Canal, would pass by Béziers, and terminate in the Lake of Thau, which would be transformed into an inland port, and take, from a defensive point of view, the same position on the Mediterranean as the estuary of the Garonne on the eastern coast of France. Both on account of convenience and economy, the canal should be established at sea-level, with a simple system of tide gates, avoiding the expensive construction of locks. Under the present financial conditions, the carrying out of so vast a project presents some difficulties, but the public have always been willing to subscribe for any great scheme, such as the Suez and Panama canals, and for one so essentially French, our contemporary believes that funds would be readily raised.

Foot-Power Folder.

The accompanying illustration indicates a modification of Stow's bar folder made by Peck, Stow & Wilcox Co., of New York, which was recently prepared for a customer for a definite purpose. The folder was made of short length, and the improvement consists in arranging the machine to work by treadle, thus leaving the hands free for managing the work. The axis of the

pleasure for refilling, and that it is exceedingly durable, without liability to get out of order.

Excelsior Expansive Bit.

A new expansive bit, in which the cutter is readily clamped without the use of a screw-driver, is being put upon the market by Tower & Lyon, 95 Chambers street, New

York. It is illustrated in the engravings herewith. The cut on the left shows the special lever by which the cutter is held in place, swung open for the purpose of adjustment, while the cut at the right shows it in position for use. The convenience of adjustment secured by this feature of construction will be appreciated by our readers generally. The effect of wear is provided for by the manner in which the screw holding the part against which the lever acts is inserted. A slight

the movement of the piston, is forced in the operation of closing the door through a tube connecting the lower with the upper portion of the cylinder, and by this expenditure of force the closing of the door is checked. There is, it will be observed, a regulating rod C, which is intended to modifying the operation of the check. If the door closes too rapidly the regulating rod is screwed down, and if too slowly it is turned up, thus permitting a more or less free movement of the oil, as may be desired. These checks are made of steel and white metal, with all parts interchangeable. Attention is called by the manufacturer to the fact that, as the working parts are submerged in oil, there can be little wear, and that they will last for years. The checks are intended especially for use on screen or inside doors where they will not be exposed to extreme cold. The ease

Foreign Markets.

FRANCE.

PARIS, July 16, 1887.—The Metal Trade has been moderately active at a decline in Copper and Lead, an advance in Tin and steadiness in Spelter. We close in France, 100 kg.: Copper, 110; Best Selected, 113.25; Tin—Bancas, 280; Billiton, 277; Straits, 273, and English, 271.25. Lead, 30 @ 41, and Spelter, 38.25 @ 38.75. Iron.—In this city competition among dealers is such that there are now selling iron as low as the Northern rolling mills—Beams at 12 @ 12.50, and Merchant iron at 13 @ 13.50 francs per 100 kg. Old Rails, without anything doing, remain at 9 francs. Machine shops continue tolerably busy at Valenciennes; less so the rolling mills. Merchant is dull and weak, but Hollow ware and Castings are quite active. With the return of confidence in public affairs better times in the iron trade, however, seem to impend. The Fines-Lille Iron Works secured a handsome Buenos Ayres harbor improvement job amounting to 20,000,000 francs. In the Valenciennes basin three rolling mills have shut down in order to further curtail production, the latter evidently still being in excess of consumption. The receipt of orders is slack, too, at Saint-Dizier; most of the foundries are nearly idle; makers of Wire Nails, Chains and Locks also complain. Coke Merchant is, nevertheless, still successful at 14 francs per 100 kg., and Mixed at 15.—*Moniteur des Interets Matériels.*

BELGIUM.

BRUXELLES, July 16, 1887.—Iron. Stagnation has been the dominant feature during the week at the iron exchange in this city, many leading operators having left for country resorts. Prices of Pig iron have, nevertheless, remained firm at 4.30 @ 4.90 francs per 100 kg., foundry, and 4.20 francs, forge, at the works. Beams have been well sustained. Steel Rails are weaker. The syndicate of blast furnace owners is not likely to dissolve, even in the event of the syndicate of rolling mill owners doing so; hence, in any event, there is not much likelihood that Pig iron will decline, unless it does so so materially abroad. The general business outlook in this country remains cheerful; the feeling in the iron and steel branches is one of confidence.—*Moniteur Industriel.*

GERMANY.

HAMBURG, July 16, 1887.—Iron.—Our Dortmund correspondent reports for the week as follows: Increased animation in finished iron has characterized the Rhenish-Westphalian market, without so far favorably influencing Pig iron, except at Siegen, where the demand has slightly improved, and where Forge Pig is now held 1 1/2 @ 2 marks per ton higher. Spiegel with 10 to 12 % Manganese is still comparatively speaking, neglected, whereas the rust to secure 20 % continues. We quote Spiegel with 10 to 12 % 50 @ 50.50 marks per ton; German Bessemer, 50 @ 51; Thomas, 41 @ 42. The improved position of Merchant iron gets to be more and more defined since makers have established a common sales office, for it now appears that in dealers' hands the stock of finished iron is so much reduced that they willingly pay the syndicate figure of 112 marks per ton in replenishing their holdings. The mischief, however, is that some makers did not join the convention, and that they go on occasionally underbidding the associated rolling mill owners. On the other hand, it may be stated that by far the majority of the latter are booked for many months ahead, and that they accept no fresh orders except with six weeks' time for delivery. Billet and Thin Sheets have, meanwhile, been steady. In the Steel Wire branch a better inquiry has at length arisen. Steel works, as a general thing, have no reason to complain if we except the Rail department still suffering from foreign competition. Bessemer Steel Wire Billets are worth 110 @ 112 marks per ton; Steel Wire Rods, 108 @ 110. Foundries and machine shops report a partial increase of activity, but at rates far from remunerative. Metals.—The dealings in Lead have increased somewhat at a slight decline; we quote, 12.50 @ 12.75 marks per 50 kg.; Copper is firm at 50 marks for the Superior; Phosphorus, 1.60; Tin, 104 @ 108; Spelter on the spot, 14.30 @ 15.30; to arrive, 14 @ 14.50; Sheet Zinc, Silesian, 17 @ 18; Vieille Montagne, 20.20 @ 20.70; do. for Sheathing, 20; Zinc Gray, 20 @ 22; do. White, 21 @ 22, and Tin Salt, 40 @ 42 1/2 @ 43 kg.—*Borrenhalte.*

HOLLAND.

ROTTERDAM, July 12, 1887.—Tin.—Has improved a little, but little offering at the advances. We quote Banca 62.50 and Billiton 61.75 @ 62 1/2 @ 50 kg. The Government returns are as follows:

Export of Tin from Holland.

	Four months.	1887.	1886.	1885.
To Germany.....	1,933	1,940	1,658	
England.....	84	83	83	
Belgium.....	404	314	225	
France.....	116	111	126	
Hamburg.....	220	179	102	
United States.....	153	214	108	
Other countries.....	251	190	115	
Total.....	3,131	2,991	2,477	

—Koch & Vlerboom.

SPAIN.

BILBAO, July 2, 1887.—Iron Ore.—Hardly anything has transpired during the week. The nominal quotation for Campanil is 6/10 @ 7/2 and for Rubios Superiores 6/6 @ 6/9. Exportation has fallen off considerably; everything is in good trim for shipment. Total shipments to date, 2,255,299 tons against same time last year, 1,687,567. Pig iron is wanted for export, and tolerably so coastwise. The Bilbao Iron Works, whose plant is in the Asturias, turned out in 1886 25,239 tons of steel, of which 11,098 tons Rails and 32,057 tons of iron. The capital of the company in shares is 12,500,000 pesetas or francs, of which 7,500,000 have been paid in, and the bond issue amounts to 2,211,000 pesetas. Last year's net profits were 860,016 pesetas, of which 364,650 have been set aside to pay the interest on the bonded debt, and 120,000 pesetas were applied to the sinking fund for the same, leaving 9 pesetas per share dividend to be distributed.—*Bilbao Maritime y Comercial.*

CHILE.

VALPARAISO, May 27, 1887.—Copper.—In spite of unfavorable cable news from Europe, Copper rose from \$15.50 to \$16.42, in consequence of the decline in exchange, and 24,755 quintals changed hands; \$15.90 equals £28. 16/. Nitrate.—Only 579,000 quintals were taken, the amounts offered being light. The price obtained was \$2.62 1/2 @ \$2.7 1/2 for 95 % and 96 % equaling 7/10 1/2 in England, with 27/6 freight, and 244d. Exchange. Charters were 13,500 tons for Europe, and 3600 for the United States. Coal has been all bought up by speculators, who ask 30 for Newcastle West Hartley, and 27/6 for Orrell. The former, June shipment, is worth 27/6, and Australian, 22/6. Exchange, 90 days, in London, 249d.—*Weber & Co.*

EAST INDIES.

PENANG, June 8, 1887.—Tin.—Laroot Tin opened a fortnight since at \$38.35, thence gave way to \$37.90, the Exchange declining, closing at \$37.92, paid by Chinese. The total export from here to England to date has been 63,571 piculs, against 38,921 in 1886; to the Continent, 815 against 785; and to the United States, 9082, against 16,511. Exchange, 4 months' Bank, 3/2.—*Schmidt, Kus-termann & Co.*

The merchants of Berlin notice some improvement in business compared with 1886, but say in their annual report just published that "a new era for great undertakings of commerce and industry has not yet come."

Exports.

The following table presents the exports of Hardware, Iron, Steel, Metals, &c., from the port of New York, for the week ending July 26, 1887:

Argentine Republic		Quan.	Val.
Hdw., pkgs.	51	1,138	
Tacks, cs.	10	45	
Arms, case.	1	75	
Ag. imp., pkgs.	1880	35,920	
Clocks, cs.	60	1,559	
Pumps, pkgs.	3	68	
Granite ware, pkgs.	53	3,108	
Mach'y, pkgs.	33	2,100	
Antwerp.			
Sew. ma., case.	1	180	
Amsterdam.			
Mach'y, pkgs.	12	144	
Brazil.			
Ag. imp., pkgs.	1	15	
Cutlery, cs.	9	129	
Mach'y, pkgs.	5	50	
Clocks, pkgs.	7	154	
British Possessions in Africa.			
Clocks, pkgs.	7	63	
Belfast.			
Sew. ma., cs.	31	1,050	
British West Indies.			
Hdw., pkgs.	57	597	
Cutlery, cs.	3	43	
Nails, kegs.	42	124	
Ag. imp., pkgs.	70	1,125	
Mach'y, pkgs.	7	175	
Mf. iron, pkgs.	47	301	
Sew. ma., cs.	8	337	
Tinware, cs.	11	171	
Nails, bxs.	35	110	
Windmills.	6	287	
Clocks, case.	1	14	
British Australia.			
Guns, case.	1	176	
Axles, cs.	10	251	
Mach'y, pkgs.	34	4,146	
Wringers, cs.	70	1,125	
Tacks, cs.	3	37	
Sew. ma., cs.	21	339	
Vault doors.	7	1,400	
Arms, cs.	2	172	
Hdw., pkgs.	813	12,330	
Ag. imp., pkgs.	49	2,390	
Mf. iron, pkgs.	22	409	
Car wheels.	300	3,540	
Nails, cs.	43	893	
Pumps, pkgs.	28	1,098	
Nails, kegs.	35	136	
Clocks, cs.	106	2,572	
Cutlery, cs.	10	182	
Cartridges, cs.	13	280	
Bremen.			
Hdw., pkgs.	33	1,726	
Rifles, cs.	4	510	
Mach'y, pkgs.	3	163	
Ag. imp., pkgs.	109	1,697	
British East Indies.			
Cartridges, cs.	3	61	
Hdw., cs.	8	86	
Ag. imp., pkgs.	2	30	
Rifles, cs.	2	209	
Pumps, pkgs.	15	800	
Clocks, pkgs.	90	1,388	
Chili.			
Hdw., cs.	3	130	
Mach'y, pkgs.	3	135	
Coruna.			
Sew. ma., cs.	2	47	
Cuba.			
Mf. iron, pgs.	414	3,610	
Nails, pkgs.	40	383	
Spikes, kegs.	541	1,300	
Mach'y, pkgs.	61	5,328	
Tinfol., cs.	4	74	
Tinware, cs.	3	126	
Pumps, pkgs.	2	56	
Copper goods, case.	1	30	
Hdw., pkgs.	70	1,412	
Sew. ma., cs.	24	542	
Tin, cs.	7	92	
Clocks, pkgs.	7	187	
Nails, kegs.	154	542	
Cutlery, cs.	8	319	
Wire goods, cs.	7	258	
Ag. imp., pkgs.	28	259	
Central America.			
Cutlery, cs.	4	120	
Mf. iron, pkgs.	938	3,352	
Steel, pkgs.	101	289	
Mach'y, pkgs.	17	1,454	
Cartridges, cs.	3	76	
Babbitt metal, boxes.	2	38	
Sew. ma., cs.	21	410	
Revolvers, cs.	2	251	
Copper goods, cs.	2	51	
Nails, box.	1	5	
Springs, box.	1	20	
Tin, pig.	1	33	
Nails, kegs.	30	72	
Hdw., pkgs.	32	1,504	
Sew. ma., cs.	45	1,019	
Rifles, cs.	2	246	
Iron, pkgs.	126	512	
Ag. imp., pkgs.	19	126	
Quicksilver, b's.	29	906	
Tinware, cs.	3	60	
Files, boxes.	117	192	
Wire cloth, rolls.	2	86	
Constantinople.			
Hdw., cs.	7	171	
Clocks, cs.	5	90	
Copenhagen.			
Ag. imp., pkgs.	4	22	
Hdw., cs.	9	172	
Met. ware, cs.	3	58	
Clocks, cs.	12	151	
Mf. iron, pkgs.	4	113	
China.			
Lead pipe, case.	1	10	
Mach'y, pkgs.	22	290	
Railroad sp. gs, cs.	4	250	
Hdw., case.	1	5	
Clocks, cs.	20	400	
Mf. iron, pkgs.	7	60	
Brass, pkgs.	1	20	
Christiania.			
Hdw., cs.	11	248	
Clocks, cs.	18	187	
Dutch West Indies.			
Nails, bxs.	4	50	
Dutch East Indies.			
Clocks, cs.	5	60	
Dublin.			
Ag. imp., pkgs.	1	35	
Ecuador.			
Mach'y, pkgs.	1	275	
Clocks, case.	1	44	
Hdw., cs.	21	346	
Mf. iron, pkgs.	11	55	
Pistols, case.	1	300	
Steel, pkgs.	1	13	
French Guiana.			
Mach'y, pkgs.	5	70	
French West Indies.			
Mf. iron, pkgs.	2	25	
Sew. ma., cs.	5	150	
Hdw., cs.	1	12	
Glasgow.			
Sew. mech., cs.	301	4,374	
Clocks, cs.	81	1,235	
Wire brushes, case.	1	185	
Hdw., pkgs.	15	477	
Pumps, pkgs.	2	86	
Genoa.			
Elect. mach'y, pkgs.	3	250	
Havre.			
Pumps, pkgs.	8	510	
Car-wheels.	4	230	
Clocks, cs.	2	500	
Sew. ma., case.	1	75	
Ag. imp., pkgs.	94	3,014	
Copper, pkgs.	241	7,125	
Printing press	1	140	
Mach'y, pkgs.	5	1,595	
Hdw., cs.	41	2,186	
Hong Kong.			
Cartridges, cs.	60	940	
Hamburg.			
Cartridges, cs.	5	154	
Hdw., cs.	2	48	
Havti.			
Hdw., cs.	3	43	
Mf. iron, pkgs.	1	15	
Pumps.	2	30	
Japan.			
Mach'y, pkgs.	19	2,820	
Clocks, pkgs.	473	7,849	
Mf. iron, pkgs.	5	35	
Hdw., pkgs.	42	389	
Leghorn.			
Ag. imp., pkgs.	3	44	
Lisbon.			
Clocks, case.	1	2	
Liverpool.			
Ag. imp., pkgs.	7	102	
Clocks, cs.	18	320	
Copper, bolls.	144	1,986	
Mach'y, pkgs.	23	808	
Hdw., pkgs.	3	190	
Mf. iron, pkgs.	6	325	
Air brake mat., cs.	30	376	
Mf. brass, cs.	3	274	
Firearms, case	1	175	
Sew. ma., cs.	135	1,705	
Copp. matte, sks.	6085	79,030	
London.			
Mach'y, pkgs.	109	10,978	
Mf. iron, pkgs.	116	1,470	
Cartridges,			
cs.	15	450	
Sew. ma., cs.	574	3,960	
Ptg. presses.	2	250	
Buckles, cs.	4	810	
Hdw., pkgs.	206	2,816	
Clocks, pkgs.	133	2,895	
Guns, case.	1	105	
Liberia.			
Arms, cs.	2	90	
Mf. iron, pkgs.	9	99	
Cartridges,			
case.	1	16	
Bells, cs.	2	34	
Nails, cs.	105	253	
Brass kettles, cks.	8	969	
Hdw., pkgs.	24	195	
Sew. ma., cs.	4	101	
Mexico.			
Mach'y, pkgs.	125	9,125	
Clocks, cs.	6	144	
Cutlery, cs.	46	1,406	
Cartridges,			
case.	1	30	
Tinware, cs.	9	89	
Agateware, cs.	2	39	
Cutlery, cs.	2	29	
Brass d's, case	1	125	
Hdw., pkgs.	89	1,174	
Nails, cs.	44	254	
Sew. ma., cs.	35	2,344	
Mf. iron, pkgs.	553	2,152	
Wire, bbs.	2	217	
Shot, b's.	24	150	
Nails, kegs.	29	90	
Per. cups, case.	1	7	
Brass goods,			
case.	1	11	
Firearms, case.	1	147	
Marseilles.			
Hdw., cs.	19	550	
Sew. ma., cs.	4	75	
Milan.			
Pumps, pkgs.	4	75	
Newcastle.			
Hdw., cs.	17	300	
Porto Rico.			
Mach'y, pkgs.	88	2,399	
Clocks, pkgs.	3	64	
Nails, cs.	4	112	
Tinware, cs.	7	119	
Cartridges, cs.	3	48	
Metal goods,			
case.	1	40	
Brass d's, cs.	2	100	
Windmill.	1	56	
Mf. iron, pkgs.	92	522	
Pumps, pkgs.	3	101	
Mf. iron, pkgs.	3	33	
Hdw., pkgs.	70	1,125	
Ag. imp., pkgs.	6	118	
Nails, kegs.	105	260	
Cutlery, cs.	2	45	
Peru.			
Cartridges,			
case.	1	45	
Ag. imp., pkgs.	4	51	
Hdw., cs.	3	54	
Mach'y, pkgs.	1	45	
Firearms, case	1	115	
Randers (Dem).			
Mach'y, pkgs.	5	325	
Rotterdam.			
Mach'y, pkgs.	3	335	
Hdw., cs.	24	460	
Ag. imp., pkgs.	4	141	
Clocks, cs.	3	78	
Firearms, cs.	2	70	
Copper, cs.	18	2,350	
Stettin.			
Pumps, pkgs.	7	165	
Stuttgart.			
Mach'y, pkgs.	1	190	
Starangar.			
Mach'y, pkgs.	1	225	
Spanish Possessions in Africa.			
Ag. imp., pkgs.	2	26	
Mach'y, pkgs.	1	51	
Clocks, cs.	6	72	
Siam.			
Hdw., cs.	30	837	
Nails, kegs.	81	214	
Santo Domingo.			
Nails, kegs.	35	79	
Hdw., pkgs.	24	529	
Mach'y, pkgs.	32	288	
Mf. iron, pkgs.	4	154	
Pumps, pkgs.	2	99	
Tinware, cs.	17	130	
Chairs and a.	4	72	
Shot, kgs.	3	89	
Spikes, kegs.	5	40	
Triguay.			
Ag. imp., pkgs.	370	5,790	
Hdw., pkgs.	46	953	
Cartridges, cs.	14	275	
Washing machines.	6	90	

Special Notices.

Proposals for Steel-cast Guns for the Navy.

NAVY DEPARTMENT,
WASHINGTON, D. C. *June 23, 1887*
Under authority conferred by the act of Congress

press, approved March 3 1887, making an appropriation for the purchase and completion of three steel-cast, rough-bored and turned, six inch, high-power rifle cannon, of domestic manufacture, one of which shall be of Bessemer steel, one of open-hearth steel, and one of crucible steel, sealed proposals from domestic manufacturers, to furnish the same, will be received at the Department until Tuesday, the second day of August, 1887, at 12 o'clock noon, at which time the proposals will be opened.

Proposals may be made either to furnish three completely finished six-inch, breech-loading, high-power rifle cannon, made from unforged castings, one of Bessemer steel, one of open-hearth steel, and one of crucible steel, or three unforged, high-power rifle cannon, made from such cannon, of the same material, respectively, to be made by the Department in accordance with the bidder's design.

* * * * *

No gun or casting for a gun will be paid for until the bidder shall have been completed and have successfully stood the statutory test, required by the act of July twenty-sixth, eighteen hundred and eighty-six, entitled "an act making appropriations for the naval service for the fiscal year ending June thirtieth, eighteen hundred and eighty-seven, and for other purposes," and a statement of requirements of said tests and of other conditions to be observed, reference is made to "specifications" which can be had upon application to the Department.]

* * * * *

For one or more guns, or for one or more castings as aforesaid, * * * (but must be made separately for each gun or casting for a gun and upon forms prepared by the Department.)

Each successful bidder will be required to execute, within fifteen days after notice of award, a formal contract in accordance with the proposal, and to furnish a bond, with satisfactory sureties, in a penal sum equal to fifteen per cent

Copies of the specifications, with blank forms of proposals, and all additional information desired can be obtained on application to the Bureau of Ordnance, Navy Department.

All proposals must be in duplicate, enclosed in envelopes marked "Proposals for Steel-cast Cannon," and addressed to the Secretary of the Navy, Navy Department, Washington, D. C.

The right is reserved to waive defects in form and to reject any or all bids.

WILLIAM C. WHITNEY,
Secretary of the Navy.

NAVY DEPARTMENT,
WASHINGTON, D. C., June 20, 1887.

In order to give more time to domestic manufacturers to consider the matter, the period limited for the reception of proposals for steel-cast guns is hereby extended, and such proposals will be received, under the foregoing advertisement, as modified, until Tuesday, the twentieth day of September, 1887, at 12 o'clock noon, at which time the proposals will be opened.

WILLIAM C. WHITNEY,
Secretary of the Navy.

WE BUY all kinds of
IRON AND STEEL SCRAP, BURN'T IRON, OLD
RAILS AND CAST BORINGS
(in carloads only). Write us, naming quantity
and price.
ROBINSON & ORR,
115 Water St., Pittsburg, Pa.
(ESTABLISHED 1859.)

WANTED.

IRON AND

STEEL SCRAP.

Address

VALENTINE & ARMSTRONG,
226 S. Fourth st., Philadelphia, Pa.

SPECIAL NOTICE.

We have constantly on hand large lots of OLD IRON and METALS to be sold cheap. Send for quotations,

PETTIS & HIGGINS,
302 Fountain St., Providence, R. I.

WE WANT

No. 1 Wrought Scrap Iron; Wrought Iron Turnings; Steel Turnings; Cast-Iron Borings; Burnt Iron, &c.

JOS. J. LIPPINCOTT & CO.,
34 1/2 Walnut St., Philadelphia

WANTED,

Iron and Steel Scrap.

We buy all kinds of Iron and Steel Scrap
Write to us when you have any to sell.
SITES, WHEELER & CO.,
221 and 223 So. Third Street,
Philadelphia, Pa.

Sharon Steel Casting Co

SHARON, PA.

are ready to receive orders for delivery in
August and later, for Steel Castings of all kinds,

from one pound up to fifteen tons. Send specifica-

tions for prices. All work guaranteed equal to
any made.

AGENTS WANTED.

In every manufacturing town to sell
D. D. Dicks, Dismuth, Dobbitt, Metal

DuPlaine's Plumbago Babbitt Metal.
Very liberal discount allowed and every inducement given you to make sales. Remember these are the Best Anti-Friction Metals made.
Address
E. A. C. DUPLAINE,

IMPORTANT

IMPORTANT.
Wanted Cast Wrought Iron and Steel Turnings
Address, THOMPSON C. GILL & CO,
Dealer in Iron and Steel of all kinds,
210 South 3d Street, Philadelphia, Pa

[illegible]

\$100 | AMERICAN GIANT DYNAMO | \$100

Electro-Plating and Electrotyping Machines

IN ALL SIZES, FROM \$100 UPWARDS.



**CHEAPEST
AND BEST IN
THE MARKET.**

Headquarters
for everything
in the Plating
and Polishing
Line.

**NICKEL
PLATING
AND
POLISHING
MATERIALS.**

ZUCKER & LEVETT CHEMICAL CO.,

ESTABLISHED 1863, INCORPORATED 1881,
SOLE MANUFACTURERS AND PATENTEES,
100 NASSAU ST., NEW YORK, U.S.A.

Special Notices.

BOOKS.

THE NEWEST BOOKS.

Modern Architectural Practice. No. 1. A large country house, with specifications, illustrations and diagrams. By BRUCE PRICE. . . . \$5.00

The Prevention of Fire. The author's suggestions on fire prevention and fire protection, although written chiefly with reference to hospitals, lunatic asylums, and orphan's homes, are equally applicable to hotels, warehouses, factories, mills, schools, churches, dwelling houses and public buildings of all kinds. Second edition. By W. P. GERHARD. . . . 60 cents

Notes Embracing Recent Practice in the Sanitary Drainage of Buildings. With memoranda on the cost of plumbing work. By WM. P. GERHARD. . . . 50 cents

Turner and Fitter's Handbook. 10th and enlarged edition. By T. GREENWOOD. . . . 60 cents

Any book published sent post-paid on receipt of price by

DAVID WILLIAMS,

66 and 68 Duane St., New York.

HELP WANTED.

Undisplayed Advertisements for Help Wanted not exceeding fifty words One Dollar each insertion. Additional words two cents each.

SALESMAN selling machinery, or one selling to manufacturers. To handle our specialty as side line on commission. Address (giving territory covered) "Box 856," Pittsburgh, Pa. References exacted.

SALESMAN—An experienced man to travel. Must be well acquainted and familiar with the Bronze, Brass Bearing and Metal trade. Address P. O. Box 394, Lockport, N. Y.

FIRST-CLASS MAN who is competent to take charge of an Open Hearth and Bessemer steel plant. Address, stating age, education, experience and salary desired. "BESSEMER" office of The Iron Age, 66 and 68 Duane St., N. Y.

A GOOD, RELIABLE, STEADY MAN, who thoroughly understands working heavy and light sheet iron, to take charge of a water and well PIPE MANUFACTORY; also three good sheet iron workers. Address "P. O. DRAWER 1079," Los Angeles, Cal.

TRAVELER TO SELL TABLE AND POCKET CUTLERY to the retail trade in the Eastern States on commission; also one each for New York State, Pennsylvania, Ohio, Indiana and Michigan; only those need answer who have an established trade and who wish to add above goods to their line. Address "CUTLERY," Box 279, Office of The Iron Age, 66 and 68 Duane St., New York.

SITUATIONS WANTED.

Undisplayed Advertisements for Situations Wanted not exceeding fifty words Fifty Cents each insertion. Additional words one cent each.

MECHANICAL ENGINEER OF LONG EXPERIENCE, competent to design, construct and superintend building of engines and machinery of any kind and for any purpose, is open for re-engagement. Preferred with parties that would take interest in and introduce valuable patented invention wanted on all kinds of engines, compressors, &c. Address "M. E." office of The Iron Age, 66 and 68 Duane St., N. Y.

A WELL-KNOWN FOUNDRYMAN, 37 years of age, wants position as FOUNDRY FOREMAN with a first-class firm in the North or West, is capable of superintending iron works employing from 100 to 200 men; is a practical mechanic on general and special heavy and light work in green and dry sand and has considerable knowledge of loam moulding. Specialty on mixtures for car wheels, chill and sand rolls, and all kinds of chill and soft mixtures. At present has management of foundry employing 25 men on machine, jobbing, locomotive, car and rolling mill work. Good reference. Address "ENERGY," office of The Iron Age, 66 and 68 Duane Street, New York.

MECHANICAL DRAUGHTSMAN, graduate M. E., with first-class references, wishes a position; able to take charge of drawing office and act as Assistant Superintendent; can offer knowledge architectural capital; the three languages fluently: 14 years' American and European experience. "E. S.," 24, Office of The Iron Age, 66 and 68 Duane St., New York.

BY A YOUNG MAN of experience as SALESMAN in the hardware, seeds, farming implements and machinery business; would not object to traveling; can furnish the best of reference; will be pleased to hear from any firm in need of a salesman. Address "C.," Box 96, Zanesville, Ohio.

IRON WORK—A competent, reliable man familiar with plans and handling men as SUPERINTENDENT of FOUNDRYMAN in city or erecting Architectural Iron Work; good reference. Address "ACTIVE," office of The Iron Age, 66 and 68 Duane St., N. Y.

BESSEMER MAN of ten years' experience in the manufacture of all kinds of steel, desires an engagement as MANAGER; an holding at present position as MANAGER; but desire to change locality; best reference can be given. Address "BLACK," Office of The Iron Age, 66 and 68 Duane Street, New York.

MARRIED MAN, 36 years of age, who has had 10 years' experience in the hardware trade, wants a situation as TRAVELING SALESMAN for a live hardware house. Address "S.," Lock Box 40, Trumansburg, N. Y.

MECHANICAL ENGINEER, thoroughly competent, with theoretical knowledge and extensive practical experience in Draughting, Estimating and Constructing various kinds of Land and Marine Engines and Boilers, Millwork and Machinery, Structural Work, Hydraulic Work, &c. Also the building of Mills, Factories, &c., desires an engagement. "254," Office of The Iron Age, 66 and 68 Duane St., New York.

SALESMAN, thoroughly posted in HARDWARE and IRON, and personally acquainted with the hardware trade, boiler makers and machine shops in Des Moines and Council Bluffs, Iowa; Omaha and Lincoln, Neb.; Kansas City, St. Joseph, Sedalia and Springfield, Mo.; Atchison, Leavenworth, Lawrence, Topeka, Fort Scott and Wichita, Kan., wishes lines of Hardware, Iron, Tools, &c., on commission, visiting the above mentioned cities every sixty days and making headquarters in Kansas City. Address "BOX 112," Station A, Kansas City, Mo.

A GENTLEMAN who has had an extensive business experience and who possesses business abilities of a high order, would like to make an arrangement to take charge of a Chicago Agency for some first-class Eastern manufacturing firm. Best of references, both East and West. Address "H.," Office of The Iron Age, 66 and 68 Duane Street, New York.

Trade Report.

British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, July 27, 1887.

Scotch Pig.—The market is not so steady. Scotch warrants are 41/11. Makers' brands are quoted as under:

Coltness, alongside, Glasgow.	48/6
Langloan	48/6
Glenarnock	48/6
Gartsherrie	48/6
Shotts	48/6
Dalmellington	48/6
Carbrook	48/6
Eglington	48/6
Summerlee	48/6
Carriage from Ardrossan to Glasgow is 1/10 ton.	

Bessemer Pig.—The market is unchanged. We quote W. C. Hematites, Nos. 1, 2 and 3, 44/45.

Cleveland Pig.—The market is unchanged at the following prices: 37/ for No. 1 Foundry; 36/ for No. 2; 35/ for No. 3, and 34/ for No. 4 Forge.

Bessemer Billets.—Bessemer Billets, 2 1/2 x 2 1/2 inches, are 77/6 @ 80/.

Bessemer Blooms.—The market is irregular. Prices are nominally 77/6 @ 80/; 7 x 7 inches.

Bessemer Crop Ends.—We quote run of mill 52/6 @ 54/6.

Manufactured Iron.—The market is unchanged. We quote:

Staff, Ord. Marked Bars	5 0 0 @ 5 10 0
Medium	5 0 0 @ 5 10 0
Common	4 15 0 @ 5 0 0
Hoops, 20 W. G. and over	5 0 0 @ 5 0 0
Common Best	5 0 0 @ 5 0 0
Medium	5 10 0 @ 5 10 0
Common	5 0 0 @ 5 0 0
Sheets, 20 W. G. and under	5 0 0 @ 5 0 0
Ordinary Best	6 5 0 @ 6 15 0
Common	5 10 0 @ 6 0 0

Welsh Bars are quoted £4. 2/6 @ £4. 5/.

Steel Rails.—The market is unchanged. Prices are £4. 2/6 @ £4. 5/.

Old Rails.—The market is irregular. Prices, Old Tees, £3. 17/6; Double Heads, c.i.f. New York, £3. 17/6 @ £4.

Scrap.—The market is irregular, with Heavy Wrought at 60/ @ 65/, c.i.f. New York.

Copper.—The market is steadier, Chili Bars closing £40. @ £40. 5/, and Best Selected £45. @ £45. 10/.

Tin.—The market is firmer, with spot at £105 @ £105. 15/, and futures at £104. 15/ @ £105. 5/.

Tin Plates.—The market is steadier. We quote:

Tin Plates, 10x14, 1st qual. Charcoal	17 @ 18
" " " " " "	16 @ 17
" " " " " "	14 @ 15
" " " " " "	13 @ 14

Spelter.—The market is a little steadier. We quote £14. 10/ @ £14. 12/6.

Lead.—We quote Common English £12. 7/6.

Freights.—Steam freights from Glasgow to New York are 10/.

Financial.

Office of The Iron Age,
WEDNESDAY EVENING, July 27, 1887.

Perhaps the most marked event of the week is the repeated break in wheat, which dropped heavily on Saturday, and again on Monday, attended with active trading and a brisk demand for export. There were eager sellers in spot stocks at the decline, stimulated by crop reports and free arrivals of winter wheat in Western cities, the harvest being nearly finished. Cotton also dropped, in the speculative markets, with spots easy and in light demand. Up to June 30 the export of wheat or its equivalent in flour made a grand total of 151,789,136 bushels, against only 94,565,793 bushels for the preceding year. In only two previous years has this been exceeded. The effect of the harvest is observed in Chicago, where the wholesale business has been quite animated in comparison with one year ago, indicative of more confidence in the business situation. New cotton exerts a like influence in the South, there being a quickened shipping movement at leading ports. In New York dry goods jobbers observe more life throughout the market, which they describe as full of buyers from all sections of the country. Staple cottons and autumn specialties were most sought for, and a growing confidence manifested. An index of prosperity observed with satisfaction is the extraordinary business of the railroads, whose net earnings show a greater percentage of gain than do the gross. The gains, too, are in comparison with exceptionally heavy returns last year.

Excessive dullness and drooping prices characterize the Stock Exchange. The alleged Baltimore and Ohio deal suddenly dropped out, its disappearance causing scarcely a ripple. The many rumors recently circulated when sifted down simply show that the Ives syndicate undertook to negotiate the sale of a large block of Baltimore and Ohio stock and failed, partly it was believed because Mr. Gould doubted their ability to deliver the stock, and partly because the figures asked were considered too high. Large operators are absent from the market. This stagnation of business is being made the subject of an investigation by a special committee, and several remedies have been suggested. Henry Clews sent a

circular to the committee, in which he argued that vigorous measures were necessary to stamp out the opposition of the Consolidated Exchange and the inroads in business made by the bucket-shops.

To-day prices again dropped, New England selling down to 45 1/2, making a decline of 4 1/2 % since Monday morning, while other shares were scaled down, but in no case to exceed 3/4 %. Board-room traders were alone in Central. Leading stocks are quoted as follows: Burlington and Quincy, 142; Canada Southern, 54; Delaware, Lackawanna and Western, 131 1/2; Delaware and Hudson Canal, 100 1/2; Illinois Central, 123; Lake Shore, 92 1/2; Lake Erie and Western, 103 1/2; Louisville and Nashville, 61 1/2; Michigan Central, 84 1/2; Missouri Pacific, 100 1/2; New York Central, 108; New York and New England, 45 1/2; Northern Pacific, 33 1/2; St. Paul, 84 1/2; Union Pacific, 54 1/2; Western Union Tel., 74 1/2.

United States bonds closed as follows:

U. S. 4 1/2, 1891, coupon	108 3/4 @ 109 1/4
U. S. 4 1/2, 1897, coupon	127 1/4 @ 127 3/4
U. S. Currency 6s, 1895	122 @ 122 1/2
U. S. Currency 6s, 1896	124 @ 124 1/2
U. S. Currency 6s, 1897	127 @ 127 1/2
U. S. Currency 6s, 1898	130 @ 130 1/2
U. S. Currency 6s, 1899	132 @ 132 1/2

General trade is quiet. On the Produce Exchange wheat closed stronger. Lard, sugar and most of the staples are steady. Petroleum is dull.

The only feature of the bank return this week is the large contraction of loans. This so reduced the deposit liabilities that, despite a loss in cash, the banks are enabled to show a gain of \$571,225 in surplus reserve. The net currency movement was slightly in favor of this center, and the banks also gained from arrivals of specie from Europe. The surplus above the 25 per cent. legal requirements is now \$3,497,300. Time money is scarce, commanding sharp 6 per cent., as lenders are disposed to hold off in expectation of active money when the autumn trade shall have fairly commenced. Banks also husband their resources in anticipation of the wants of their customers. According to the Custom House report the imports of specie at this port last week amounted to \$710,865, and the exports were \$221,300. Since January 1 the imports are \$7,534,518, and the exports \$10,838,686.

Foreign Exchange has ruled dull but steady at rates slightly above the gold importing point, and bar silver in London is easier.

The imports of merchandise at this port last week were valued at \$8,392,673, making a total since January 1 of \$262,309,265, against \$242,426,000 for the same time in 1886, and \$217,522,800 in 1885. The exports were \$3,000,000 and upward below those of the previous week, the valuation being \$3,888,000, making a total since January 1 of \$168,988,930, against \$177,901,000 for the corresponding period last year, and \$190,311,000 in 1885. The items include 646,000 bushels of wheat, 4242 bales of cotton, and 4,898,500 gallons of petroleum.

London advices announce the withdrawal of \$2,000,000 in gold for South America. The shipment has significance only as exciting apprehensions in London that a drain in gold for America may at any time set in, compelling the Bank of England to raise its rate of interest.

The statistics of the foreign commerce of the United States for the fiscal year are made complete by the returns for June, now at hand. The imports for the month were unexpectedly large, amounting to \$62,650,109, or \$12,237,573 in excess of the exports, while for June, 1886, the balance of over \$10,000,000 was in favor of the United States. The totals for the last two fiscal years compare as follows:

Total exports	\$751,988,240	\$752,702,675
Total imports	674,029,792	752,428,818

Balance of trade..... \$77,958,448 @ \$79,882 These figures are significant, as the fiscal year ending with June, 1884, showed a balance of trade in our favor to the extent of \$102,523,937; the next year, 1885, the balance was still larger, amounting to \$163,651,628; for the year ending June 30, 1886, it fell to \$77,958,448, and for the last year practically disappeared. As heavy exports of cotton and grain are not ordinarily expected before October, it is not unlikely that the balance of trade will be against the United States for three months to come.

Trade in the new bullion silver certificates is as yet confined within a very narrow range. The bulletins show that up to the close of business on Saturday last there had been deposited 237,670 ounces of silver, and that 237 certificates had been issued. On Thursday, the first day, there were only 2000 ounces or two certificates dealt in, and on Friday, 40 certificates, or 40,000 ounces. The selling was almost entirely by bullion brokers.

The principal Custom House deputy collectors, under the reorganization to take effect August 1, are as follows: General administration, Chas. L. Davis; entry of merchandise, C. O. Rockwell; warehousing and withdrawals, F. H. Wright; bonded goods and warehouses, Samuel Guthrie; public stores, William A. Jones; liquidations, James E. Jones; drawbacks, William Peters; law, C. P. McClelland.

The First National Bank of Deposit of the City of New York, organized by members of the drug trade, is about to commence business corner of Liberty and Nassau streets. Lewis E. Ransom is President.

General Hardware.

The business of the past half year is generally regarded as having been exceptionally satisfactory, both on the part of manufacturers and the jobbing trade. Business in the West has been and still continues very good, and the condition of things throughout the country is referred to as indicating an early and large trade. Prices since the last report have been very regular, there being few changes. The tone of the market continues firm, and there is but little disposition to cut prices or to make unusual concessions to secure orders.

BARB WIRE.

The market presents no specially new features, the volume of business being moderate and prices characterized by a good tone. Quotations continue 4.10 cents per carload lots for 4-point Galvanized, 4.30 cents for 3-ton lots and 4.40 cents for smaller lots.

NAILS.

There has been no further strengthening in the market for Cut Nails, and prices remain without material change. Quotations are \$2.10 for carload lots, some being offered at slightly lower figures. Some of the makers of Steel Cut Nails are full of orders booked at the recent low prices.

MISCELLANEOUS PRICES.

The low prices which have been ruling on Heavy Hammers and Sledges continue to be offered. Some of the manufacturers, however, are not willing to meet the extreme figures and are not soliciting orders aggressively. From the present outlook there does not appear to be an immediate prospect of higher prices, while the cost of manufacture will not, it is thought, permit them to go lower. The trade are buying freely of these goods, with the conviction that they are a safe purchase at ruling prices.

The attention which has recently been given by the Steel Goods association to the matter of purchases for next season, which were made in contravention of the agreement among the manufacturers, has had the result of checking the acceptance of such orders. A vigorous effort is being made to bring about a strong arrangement among the manufacturers in this line, by which regularity will be given to prices, and a profit secured in making the goods.

The growth during the last year of the sale of Standard Wire Nails has been remarkable, and these goods have been rapidly coming into prominence and now occupy an important place in competition with the Cut Nails. Their use is evidently still increasing, and there are those who think that they will to a very large extent take the place of the Cut Nails. They may be quoted at \$3.15 to \$3.30, in small lots, the factory price for large lots being in most cases \$3, a slightly advanced figure being asked by a few makers.

The arrangement made by the associated Sandpaper manufacturers with a view to preventing the cutting in prices on the part of the jobbers, which has lately prevailed to such an extent, is regarded as working thus far pretty successfully. By this new arrangement the discount is made 20 per cent., with a rebate of 5 per cent. at the end of six months to purchasers whose aggregate purchases amount to \$250, and do not exceed \$500. Those whose purchases amount to \$500, and do not exceed \$1500, are entitled to a rebate of 7 1/2 per cent. Those whose purchases amount to \$1500 and over are entitled to a rebate of 10 per cent., but all these rebates are conditional on the maintenance of the price by the purchaser. While most of the jobbing houses have been maintaining the price, some of them since this arrangement went into effect have been making sales at about the former prices. Wadell & Co. are still outside of the combination, and selling at about discount 30 to 33 1/2 per cent., but are so well supplied with orders that they are unable to make prompt shipments.

John Maxwell, 247-249 Pearl street, New York, issues a circular devoted to the Maxwell Hat, Coat and Umbrella Hooks, of which we recently gave a description. These goods are made under patents August 1, 1876 and July 6, 1887. The following net prices are given with the intimation that there is a liberal discount to jobbers:

No. 1, Chestnut Bronze	Per doz.
No. 2, Gold Bronze	\$0.42
No. 3, Brass Plate	0.53
No. 4, Chestnut Bronze	0.88
No. 5, Gold Bronze	0.84
No. 6, Brass Plate	1.00
No. 7, Gold Bronze	1.50

The House Liquid Door Check, a description of which is given on page 17, is put on the market by E. E. Graves, Bridgeport, Conn., and sold at \$12 per dozen, subject to a discount of 40 per cent.

Zisel's Patent Grass Elevator, which is manufactured by J. C. Butler & Co., Sandusky, Ohio, is sold at the following prices:

12 to 15 inches, each	\$2.00
16 to 20 inches, each	2.25
Extra Baskets, per doz.	1.00
Extra Carries, per doz.	1.00

The price of the Square Hole Auger Machines manufactured by the Square Hole Auger Company, Wooster, Ohio, is \$25, subject to a discount of 20 per cent.

The Penfield Block Company, Lockport, N. Y., the Henry B. Newhall Company, 105 Chambers street, New York, agents, have designed a new pattern Snow Shovel for use in sections which are visited usually by light falls of snow. They have named it the Fairy. Only one size will be made at

present. The blade will be extra large, 16 x 20 inches, bound on three sides with sheet iron. Will have a handle with an improved band; length of handle 2 feet 8 inches. The material in handle will be hard wood, and the whole Shovel is referred to as well made and serviceable. It is listed at \$7 per dozen, subject to a discount to the trade of 50 per cent.

MANUFACTURERS' READING-ROOM.

Messrs. E. C. Stearns & Co., manufacturers of Hardware specialties in Syracuse, N. Y., have established a feature in their manufactory which might be imitated to advantage by other establishments employing a large number of workmen. It is a reading-room wherein may be found more than 100 different journals and periodicals devoted to scientific and mechanical subjects. These journals and periodicals are preserved carefully and placed on file in a room especially arranged for the purpose in the main building. The room is provided with long tables, shelves and benches, and is removed from the noise of the machinery, so that it is a quiet place where employees may spend their time profitably reading, writing or drafting. This industrial library finds favor among the men, who take advantage of the opportunity by keeping posted relative to current events in the scientific and mechanical world. By this plan the foremen are enabled to keep up with the times in their several departments, especially in plating, japanning, molding, pattern making, tempering, staining, and in the invention of machinery of all kinds for labor-saving in their special industry. The example of reading and study thus set by the foremen has a marked influence on subordinates, and thus this reading room or library furnishes an educational influence which is referred to as steadily molding the character of employees into a higher type of intelligence and manliness. In this unpretentious way E. C. Stearns & Co. are public benefactors and setting an example which might be followed with advantage in other factories.

OBITUARY.

The death of James M. Vance, senior member of the firm of James M. Vance & Co., Hardware merchants, 211 and 213 Market street, Philadelphia, took place on the 22d inst. Mr. Vance was born in Bucks County, Pa., January 1, 1819, and went to Philadelphia when a young man, and secured employment in the Hardware store of Ellis S. Archer. Subsequently he connected himself with the Hardware establishment of William Dilworth, the firm afterward becoming Dilworth & Branson; Mr. Vance subsequently having a place in the firm as partner. The firm afterward became Vance & Landis, but in 1870 Mr. Landis retired, and its style was changed to James M. Vance & Co. Mr. Vance was a director of the Fire Association of Philadelphia, and of the Union National Bank, and president of the Trenton Lock and Hardware Company.

ITEMS.

A large, well-arranged and useful catalogue devoted to supplies for Boiler-Makers, Machinists, Railroads, Steam and Gas Fitters, &c., has been issued by Ripley & Bronson, St. Louis. It bears date July, 1887. It refers to such lines as Lap-Welded Pipe and Boiler Tubes, Natural Gas Supplies, Boiler and Sheet-Iron Rivets, Steam Brass Goods and Engine Trimmings, Iron Valves and Fittings, Steam-Heating Apparatus, Belting, Hose and Packing, and Boiler-Makers', Gas Fitters' and Machinists' Tools. A full stock is carried of the lines represented, and reference is made to the fact that the firm have recently added largely to their warehouses, so that they are enabled to handle a much larger quantity of goods than heretofore, and to fill orders with dispatch. Their determination to make the prompt execution of orders a specialty is alluded to. In this catalogue manufacturers' standard lists have been adopted, and the effort is made to have it represent all goods in these lines of latest designs and improvements. It is an exceptionally complete and satisfactory exhibit of the lines to which it relates, and will be appreciated by those for whom it is designed.

We are glad to be able to announce that the fire in the factory of the Gooch Freezer Company, Cincinnati, Ohio, which occurred on the 20th inst., does not turn out to be as serious as was supposed from first reports. The damage was fully covered by insurance, and the only actual loss to the company will be that which results from the interruption of business during the time they are rebuilding. This, however, they are doing with energy, and expect to be able to resume operations within three weeks. The machinery is described as in fairly good condition, needing only to be cleaned. This is owing to the fact that the fire originated in a portion of the building where there was but little machinery, and was more or less confined there. The company had made their heaviest shipments, and their stock of finished products was in consequence light.

The George D. Winchell Mfg. Company, Cincinnati, Ohio, have issued in their usual attractive style a new catalogue and price list illustrating their varied line of Coal Vases and Coal Hods. The different patterns which they make are effectively represented, and attention is called to the large variety and the new and elegant decoration.

The Witte Hardware Company, St. Louis, Mo., issue under date of July 15 a second

installment of the advance pages of their new catalogue. It covers a line of Guns, Ammunition, Gun Materials, Implements and Supplies, Traps, Axes, Hatchets, Saws, Meat Cutters, Lanterns, Stove Boards, Coal Vases, Shovels, Fire Irons, &c.

Romer Bros. Mfg. Company, Gowanda, N. Y., for whom W. Dodman, 107 Chambers street, New York, is agent, represent in their catalogue the line of Axes of which they are manufacturers. They are also making Sisson's patent Saw Gummer, which is illustrated in a circular devoted to it. They also send out, for retailers' use, a neat lithograph illustrating its use.

The Union Indurated Fibre Company, at their factory at Mechanicsville, N. Y., are now manufacturing Tubes or Pipes from Wood Fiber by a patent process. They have arranged with the Board of Electrical Control of New York City, who "have charge of laying underground all wires, electric light, telephone and telegraph," for a large quantity of these Tubes, and are negotiating with one of the largest natural-gas companies for an extensive supply of Pipes. The claims made for the Pipe are very broad. Tests made in connection with the Subway Commission, or Board of Electrical Control, showed the material to have a tensile strength of about 1100 pounds to the inch, and 2½-inch Pipe will stand 80 to 100 pounds pressure to the square inch. The Tubes are described as light, strong and cheaper than iron. They are made now in lengths of about 5 feet, and threaded with the standard Iron Pipe thread, so as to be connected with Iron Pipe. Two and one-half inches is the smallest size now made, but the company will soon be in shape to fill all orders for any size from 2 inches up. As a non-conductor of electricity, Indurated Fibre Ware is referred to as unexcelled, and its adaptation for use for Water and other Conducting Pipes, as it is proof against all but corrosive acids, is alluded to. The Tubes are also referred to as adapted for rolling paper in paper mills by the Webb presses, and also for use in paper mills for Water Pipes, where rust from Iron Pipes is detrimental.

The Ithaca Gun Company, Ithaca, N. Y., issue a pamphlet devoted to the line of Breech-Loading Double-Barreled Shotguns which they are making. It illustrates the construction and special feature of these Guns, one illustration showing the Gun complete, another representing it with stock removed, showing the steel breech or frame, to the merit of which special attention is called, and still another showing the working part of the locks full size. A variety of Gun Cases, Implements, &c., is also shown. In their introductory circular they refer as follows to the Guns they are making:

It is perhaps well for us to explain, briefly, the plan upon which we have endeavored to fill a place in manufacturing for American sportsmen a gun that will meet the requirements of their own recognized standard of what a gun must be and do, to suit the varied wants of so wide a range of shooting as this vast country affords. There is probably no manufactured article in use upon which there has been more inventive study and ability expended than fire-arms, and in regard to breech-loading shotguns, certain principles of construction and manipulation have been settled upon as essential to their satisfactory performance. Briefly stated, a gun must have top lever, low hammers, rebounding locks, extension rib, self fastening fore end and pistol grip, and it will be seen upon referring to cut-off "Gun Complete" (which is an accurate copy of its exact proportions), we have all these features in their most desirable form; and we wish it distinctly understood that our cheapest gun has every quality of this description that can be found in the most approved or expensive gun in the market. Next in order to be considered is the shooting qualities, durability, and cost of the gun in comparison with those of other makers. As the shooting of the gun is the one object for which it is made, we spare neither time nor expense in this department of our business. We employ the best skilled labor, and with the improvements gained by constant study, we say with confidence that it has no superior in shooting qualities. It will be seen upon examination that every part of the gun is forged in our own factory of the best material that is possible to be had, together with good workmanship, we guarantee its durability in the most positive terms.

Their price list shows that they are making six qualities, A, B, C, D, E and F, the list prices of which range from \$35 to \$200. The rapid increase of their business and its present extent are also alluded to.

John R. Whittemore, Chicopee Falls, Mass., issues circulars relating to his Champion Spring Tooth Riding Harrow, the new Victor Feed Cutter, Champion Vegetable Cutter and Victor Cultivator.

The Cleveland Machine Company, Cleveland, Ohio, issue a catalogue and price list devoted to their Solid Steel Forged Shears and Scissors. From this it appears that they are making Straight Trimmers in two patterns, Bent Trimmers, Bankers' or Paper-Hangers' Shears, Button Hole Scissors with adjustable screw, Pocket Scissors, Ladies' and Embroidery Scissors, and Barbers' Shears. The company refer to the success which has attended the manufacture of these goods from solid steel forgings, and allude to the results of this first year as exceeding their most sanguine expectations. Their works are referred to as insufficient to enable them to meet the demand of the trade, and announce that during the coming fall and winter they will build additional room, and

install more machinery. The Steel used is prepared, they state, especially for their use, and is tested before it goes into the forge for Shears and Scissors. The company have decided to make their own Screws, and mention that as their Shears are harder than others they require absolutely uniform size and hardness of Screws, by which means they secure a closer joint, and produce Shears that will stay together.

Referring to the interest of the series of articles we have been giving in regard to the arrangement of Hardware stores, a Massachusetts Hardwareman writes as follows:

The articles devoted to the arrangement of Hardware stores have paid me for a number of years' subscription. I took a blank book, and as fast as the articles appeared I cut them out and pasted them in. I have the book let out now in another State. A Hardware drummer saw several ideas that I had followed and wanted to know where I got on to them, so I showed him the book, when he borrowed it for his brother who was fitting up a store. That is how it happens to be out visiting. I devoted some time to the study of the several cuts and plans, and write to say that I would never have as neat a store as I now have if it had not been for your efforts in this direction.

The Square Hole Auger Company, Wooster, Ohio, have disposed of the right to manufacture and sell their Square Hole Auger Machine in Illinois and Indiana, to the Square Hole Boring Machine Company, Terra Haute, Ind. Their style of machine is slightly different from that made by the Square Hole Auger Company, but the principle is the same.

The Union Indurated Fibre Company, 110 Chamber street, New York, call our attention to some errors in an article on Wood Pulp Pails, taken from one of our exchanges, which appeared in our last issue. These pails were spoken of as baked at a temperature of 100° F., whereas the company advise us that they are baked at a temperature of 280°, and they also emphasize the fact that neither oil nor varnish is used on their goods.

Frank Parr & Co., Buffalo, N. Y., are now manufacturing Wrought Iron Goods, and after August 15, expect to be in a position to fill orders promptly for 6, 8, and 10 inch Heavy Strap and T-Hinges. He alludes to his goods as being well finished and packed in good, strong boxes. Walsh, Hoen & Von Kapf, Baltimore, are general agents for the South.

F.O.B.

As bearing upon this question the following from the *Journal of Commerce* of this city, a recognized authority in commercial matters, will be of interest. While the direct inquiry relates to another point, it will be observed that the editorial reply refers to the generally accepted significance in trade circles of the term f.o.b. The extract gives, it will be perceived, the question of the correspondent and the editorial reply:

Question.—Are mercantile terms (c.f.i.) cost, freight and insurance and (f.o.b.) free on board, identical expressions? Having received several orders lately from Europe for merchandise I notice that in some instances f.o.b. is considered to cover freight, where, as I have always presumed, the letters c.f.i. were used in such cases. **Answer.**—We cannot say in what sense the writer's friends may have used these abbreviations, but we have always understood that f.o.b. in an order required the shipment of the goods at the price named free of all other charges up to the day of sailing, and c.f.i. to require the price named to limit the cost up to the point of delivery on the vessel's arrival. When a man in New York orders an article in Liverpool by a steamer at a certain price f.o.b. he means that to cover the cost of placing it on board the steamer there ready for the voyage; but if his order is c.f.i., that would bring it free to the landing in this city (New York).

Goulds Mfg. Company, Seneca Falls, N. Y.—We do not consider it has any application whatever to charge for cases, but refers only to cartage. We might say, however, that when we buy goods "delivered," we never pay cartage whether specified f.o.b. or not. In short, this is a part of the delivery.

Covert Mfg. Company, West Troy, N. Y.—F.o.b. means that we charge nothing for cases or cartage.

Gleason & Bailey Mfg. Company, Seneca Falls, N. Y.—We understand f.o.b. to mean freight and cartage and nothing to do with cases. Just a matter of delivery.

Goulds & Austin, Chicago, Ill.—We make no charge for cases when we sell goods f.o.b. **John S. Davis's Sons, Davenport, Iowa.**—We understand that the term f.o.b. signifies that no charge is to be made for cases or cartage.

Corbett, Failing & Co., Portland, Ore.—All or nearly all the goods which we buy f.o.b. are goods on which usually no charge for cases is made—i. e., heavy goods like Nails, Horse Shoes, Tacks, &c., which come in regular packages. Shelf Hardware is seldom delivered f.o.b., and when it is, we suppose the humor of the shipper or a special understanding rules as to charge or no charge for cases.

Langstaff & Co., Memphis, Tenn.—We consider f.o.b. means that there is to be neither cartage nor drayage.

Isaac Walker Hardware Company, Peoria, Ill.—We understand the term f.o.b., as applied in the purchase of a bill of goods, to signify that no charge is to be made for cartage, but cases may be charged for or not, as is customary in their special line of goods.

Hall & Willis Hardware Company, Kansas City, Mo.—When we purchase goods f.o.b., or delivered, we do not expect to be charged for cases, unless it is so agreed upon between the manufacturers and ourselves,

as in the case of Locks. On some there is a charge of about 4 cents per dozen, while others do not make any charge for cases. On some goods the term f.o.b. is agreed upon, and a percentage charged for cases which are accepted by the purchaser.

Roberts, Hardwicke & Taylor, Sherman, Tex.—We understand the term f.o.b., as applied in the quotation of prices, &c., to signify that no charge is to be made for cartage or loading, having no reference whatever to cases.

John Davis & Co., Chicago, Ill.—Unless there is a special agreement, f.o.b. means simply that the goods are to be delivered on cars without any charge for cartage.

G. H. Gurney & Co., Chicago, Ill.—We understand it to apply only to cartage, and to mean free on board.

Alderman, Varnelle & Co., Fort Wayne, Ind.—Our understanding is that the term f.o.b. means simply no cartage, and has nothing to do with the charge for boxes or barrels.

Norwalk Lock Company, S. Norwalk, Conn.—We understand the term f.o.b. to mean delivery of goods on board of cars or boat, or, as specified, free of any expense for cartage. The item of cases with us is subject to special agreement by adding or accepting "and no charge for cases."

Landers, Frary & Clark, New Britain, Conn.—F.o.b. has nothing to do with matter of cases. It applies only to matter of cartage.

Harris & Flippin, Greensboro', N. C.—Our opinion is that usage has made the term f.o.b. refer to cartage only, but literally it refers to both cartage and cases, we think.

Mallory-Wheeler Company, New Haven, Conn.—We understand the term f.o.b. to refer to cartage only.

W. H. Smith Hardware Company, Parkersburg, W. Va.—We understand the term f.o.b., as applied to the purchase of a bill of goods, to mean that there is to be no charge for either cases or cartage. We also understand that there is no charge to be made for cases when goods are delivered.

United Brass Company, 79 Fulton street, N. Y.—We have always understood the term f.o.b., as applied in the purchase of a bill of goods, to signify no charge for cartage only. In our line of business, cases are always charged unless by special agreement otherwise.

Peck, Stow & Wilcox Company, Southington, Conn.—The term f.o.b., as we use it, refers only to the matter of cartage, and does not apply to cases. It is true that, as a rule, we make no charge for cases, but that is not indicated by the use of the term f.o.b., which merely signifies that goods are delivered at the railway station without charge to the purchaser.

J. S. Brown Hardware Company, Galveston, Texas.—We understand it to mean as it says. When goods are sold f.o.b. we think no charge of any kind can be just, or collected. When cases are charged, it is not f.o.b.

P. & F. Corbin, New Britain, Conn.—We understand f.o.b. to mean goods delivered and cases charged—at any rate, this is our interpretation of the expression.

Eagle Lock Company, Terryville, Conn.—As we understand it refers only to cartage.

Norwich Lock Mfg. Company, Norwich, Conn.—This is a disputed point. It is best to be careful in making a trade to have such terms stated in full.

Wm. Blair & Co., Chicago, Ill.—Goods "delivered" are free of all charges in store, including cases, unless expressly stipulated to the contrary. F.o.b. simply means no charge for cartage.

Michael Greenbaum's Sons, Chicago, Ill.—When buying goods f.o.b. Chicago, we understand that they are delivered here free of all cost for cases, freight, cartage, &c. In special cases, where goods are sold to us too low to allow the manufacturer to waive the expense of cases, we expect to pay for same where we have so agreed to, on account of above reason.

Erna H. Linley, St. Louis, Mo.—When buying or selling, I understand f.o.b. to mean no charge for boxing or drayage.

Hilger Hardware Company, St. Louis, Mo.—Our interpretation of the term f.o.b. is that goods are to be delivered on cars or vessel without any charge. If, however, by accepted custom charge is made for packages on a special line of goods, our understanding is that such packages must be paid for.

Bonner & Zollner Iron Company, St. Louis, Mo.—We understand the term f.o.b. to refer only to cartage and not to cases or boxes.

Geo. A. Rubelmann Hardware Company, St. Louis, Mo.—We understand it to mean no charge for drayage and boxing or anything else except the goods.

Ripley & Bronson, St. Louis, Mo.—Some parties make a charge for casing and live up to the rule, we think, without any deviation. A quotation from them of a price f.o.b. to their customers, they knowing it to be the rule to make the charge for casing, would, of course, be understood that f.o.b. in such a case did not mean free of boxing or casing charges. We are of the opinion that you will find a very wide difference as to what f.o.b. really means. Our idea is that it simply means that there is to be no charge for cartage or hauling.

A. F. Shapleigh and Cantwell Hardware Company, St. Louis, Mo.—The term f.o.b. is an old English expression meaning free delivery of goods on board vessel, or without expense for transportation or drayage of same to vessel. It does not cover cases or any other condition, except the drayage from point of manufacture to the cars or boat. Some of the factories lately have included in f.o.b. free cases. In the strict expression of the term it simply means as above.

N. O. Nelson Mfg. Company, St. Louis, Mo.—In all lines of our trade f.o.b. means free on cars or boat without any charges whatever except the price. This is a fully established understanding in our goods, both East and West, but it may not be the accepted

understanding in certain special classes of Hardware goods where cases are always charged.

Fischall & Fall, Nashville, Tenn.—Refers only to cartage.

J. M. Hamilton & Co., Nashville, Tenn.—The term f.o.b. applies to drayage only.

Eatherly Hardware Company, Nashville, Tenn.—Our idea is that f.o.b. implies that there is to be no charge for cases. When cases are charged for it is not f.o.b.

Fulton, Conway & Co., Louisville, Ky.—We understand the letters f.o.b. to mean literally what they stand for, free on board, and so apply it in our business, making no charge for cases or cartage.

Dunning & Co., Auburn, N. Y.—F.o.b. has nothing to do with cases. It simply means that goods are to be delivered free on board. We have had this understanding for the last 30 years, and any one who knows anything of commercial transactions, so understands it.

Macey & Co., Nashville, Tenn.—F.o.b. is an abbreviation for free on board—that is, the goods you buy are to be delivered free on board either at shipping place or destination as agreed. Hence there can be no charges for cases or cartage. We not only understand this to be the meaning of the term, but have always found it so practiced, and are surprised that there could be any doubt about it.

Blenker & Weaver, Evansville, Ind.—We understand f.o.b. to mean no charges for boxing or drayage.

Vance & Kirby, Chattanooga, Tenn.—There are a great many goods shipped by factories on which no casing or boxing is charged. We infer f.o.b. relates to cartage only.

W. B. Belknap & Co., Louisville, Ky.—Our construction of this is that it applies only to cartage. It has never occurred to us to attempt to apply it to anything else. When cases are to be excluded we are careful to insert the clause "No charge for cases."

Kilbourne, Jones & Co., Columbus, Ohio.—Manufacturers hold different views, and in ordering goods we note as a rule "f.o.b. cases free" in our orders.

The Thomas T. Miller Hardware Company, Easton, Pa.—We understand f.o.b. to mean free on board of all expense. If A B C, of whom I have been in the habit of buying have heretofore charged casing and cartage, and I should now state in my order f.o.b., I should certainly consider that all expenses that were before connected with the sale should now cease, and f.o.b. would mean with us no expense whatever attached to the goods.

Blast-Pipes.

In a recent issue the *London Engineer* reviews the subject of blast-pipes in locomotives in the following interesting manner:

It is a remarkable fact that while all locomotive engineers know that the part played by the blast pipe or exhaust nozzle of a locomotive engine exercises a most important influence on the performance of the engine, little or no effort has been made to improve it. In the old days of coke fires and gab gear, very small blast-pipes were used. The back pressure was correspondingly high, but the engines kept steam well, and nothing more was demanded. As further experience was gained, the blast-pipe was made larger and larger, and locomotive superintendents boast of the size of their blast-pipes as an evidence of the good qualities of their engines. But in Great Britain nothing has been done until quite recently to add to the efficiency of the exhaust. On the Continent at a comparatively early period adjustable blast-pipes were used, and are still very freely employed. The area of opening can be altered at will from the foot-plate to suit the demands of the boiler for steam. But in this country adjustable blast-pipes have hardly ever been fitted. It is not easy to say why, unless that locomotive superintendents have thought it better to regulate the production of steam by the aid of ashpan dampers. No attention has been paid worth mentioning in this country to the height of the blast pipe. It was held that so long as it stood just above the top row of tubes it was about right, 2 or 3 inches more or less making no difference. Almost the only exception we can name was the practice of Mr. David Joy, who, when locomotive superintendent of the Oxford and Worcester Railway in 1856, used blast-pipes 5½ inches diameter, with cylinders 16 x 22 inches stroke. The driving wheels were 5 feet 9 inches diameter. The blast-pipe was placed very low down in the smoke-box, and had a copper top, the position of which could be adjusted till the best result was got. The engines weighed about 32 tons, and hauled eight coaches weighing about 9 tons each. The run of 50 miles was made in one hour and twenty minutes, with four stops, on 20 pounds of coke per mile. In the United States engineers very early adopted what is known as the "petticoat pipe." That is to say, the true exhaust nozzle was put very low down in the smoke-box, and above it were arranged a series of truncated cones, the small end of one standing in the large end of the next one above it. This scheme works well, reducing the discharge of cinders and augmenting the power of the boiler. This has never been adopted in England, and only to limited extent in Europe. Quite recently, however, locomotive superintendents have turned their attention to the blast pipe; Mr. Adams, of the South-Western, Mr. Webb, of Crews, and Mr. Appleby, of the Waterford and Limerick Railway, all working in the same direction, but on somewhat different lines. Before describing what they are doing, it will be well to explain what is the object they have in view.

In a locomotive boiler, the calorimeter or gross sectional area through the tubes is so large that the products of combustion can select which tubes they will pass through. The result is that all the tubes are not equally efficient. The hot gas not only takes the line of least resistance, but it obeys the greatest pulling force. A little thought will suffice to show that the products of combustion, because of their levity, will always try to rise. They will therefore tend to escape

through the upper rows of tubes in preference to the lower rows. Furthermore, in order to get at the lower rows, they have to descend along the back of the fire brick arch, now invariably fitted in English engines. This still further tends to reduce the efficiency of the lower rows of tubes. Again, the pull of the blast-pipe is greatest just at the level of the top rows, making matters still worse. Experiments made years ago in the United States showed that so inefficient are the lower rows that plugging up some 15 per cent. of the whole tube capacity of the boiler did not make 1 per cent. difference in the steaming power of the boiler or its economy. To overcome this difficulty it is necessary that the pull of the blast should be diffused or equalized, so that the hot gases may flow in equal quantity through all the tubes. This is productive of economy in two ways. In the first place, the faster the products of combustion flow through the tubes the less is the time available for giving up their heat. Consequently, anything which will reduce the velocity of flow, other things being equal, the greater will be the economy. In the second place, the more equal the distribution of the hot gases throughout the whole number of tubes, the more efficient will the heating surface be. There is a secondary form of economy which we must not pass unnoticed. The smaller the back pressure the better; but in the locomotive there must always be some back pressure or the draft would not be sufficiently powerful. But the draft depends on the inductive action of the steam escaping up the chimney in practically a continuous stream. Now, perhaps the most inefficient way of making use of the exhaust is that generally adopted. Mr. Korting has shown, on the one hand, how by properly constructing what is virtually a blast-pipe—we refer to the well-known Korting air ejector—an enormous quantity of air can be moved by a very small quantity of steam; and Mr. Gresham, on the other hand, has shown how, by proportioning the parts of an ejector on scientific principles, almost an absolute vacuum can be obtained by the inductive action of a jet of high-pressure steam. With such facts available, it seems remarkable that engineers have not tried modifications of these systems suited to the locomotive. The whole function of the exhaust is to make the nearest possible approach—within the limiting conditions—to a vacuum in the smoke-box, with the least expenditure of power in the shape of back pressure. It has long been known that the distance between the nozzle and base of the chimney plays an important part in this. It has also been known that an annular jet is more effective than a solid jet, but no advantage has been taken of this.

To return now to the consideration of what is being actually done. We have first Mr. Webb's work. Very little has been made public on this subject, but we understand that he is using two distinct annular blast-pipes, combined with a species of breeches pipe, and that each cylinder exhausts into its own blast-pipe. The result is that not only is the steaming power of the boiler greatly augmented, but that a very curious action is set up by the alternate exhausts, each one tending to make a vacuum in the other pipe, and we understand that the effect is so marked at fairly high speeds, not only is the back pressure reduced all through the stroke, but the moment the exhaust port opens the pressure falls below that of the atmosphere by a couple of pounds. Mr. W. Adams has adopted a blast-pipe intended to equalize the draft through the tubes. The exhaust pipe is swelled out low down in the smoke-box, and a species of trumpet-mouth is fitted to it facing the lower rows of tubes. The exhaust is annular. We understand that the results obtained are admirable, but no definite figures on the subject have yet been made public. The most remarkable advance seems, however, to have been made by Mr. Appleby, locomotive superintendent of the Waterford and Limerick Railway. He has combined the annular system most ingeniously with an adjustable blast-pipe, and has carried out experiments which show that he has obtained a remarkable advantage. A good engine, running with the ordinary blast-pipe, burned during the month from February 22 to March 22, 35.78 pounds per mile, with an average load of 31 wagons. It was since fitted with his blast-pipe, and during the month, April 21 to March 21, burned 29.94 pounds per mile, with a load of 28 wagons. Equalizing the figures to the loads, we find that with 28 wagons the coal consumption should have been about 35 pounds per mile; deducting from this, in round numbers, 30 pounds, we have a saving of 5 pounds per mile, or, say, 16 per cent. Even if we make some allowance for the fact that the weather was worse February-March than it was April-May, it still appears that an enormous saving has been effected by very simple and inexpensive agency. We have no record, indeed, of a greater saving made by adopting the compound system.

We do not for a moment suppose that the saving is due to a reduction of back pressure alone, though that may no doubt have helped. It is far more likely that it is due to an increased boiler evaporative efficiency. It is to be hoped that Mr. Appleby will see his way to carry out some experiments on this point. There can be very little doubt that the most is not being got out of the locomotive boiler of which it is capable. Unfortunately, it has been so good and has done so well that engineers have rested content to accept what they got thankfully, and do not trouble themselves to get more. But an exhaustive series of experiments which might readily be carried out would, we feel convinced, give a good reward; and this applies not only to locomotive engines, but to all boilers which depend on exhaust steam for their draft. It is well known that the fire-box efficiency of such boilers is very much higher than that of the tubes. Efforts ought, therefore, to be directed to the tubes. The equalization of current through them, and the reduction of the velocity, are the things needful. While the existing system of blast is retained no progress will be made. But we have little reason to doubt that, as far as the locomotive is concerned, it is doomed.

MECHANICAL.

Improved Molder.

The accompanying cut represents a new and improved molder recently brought out by Rowley & Hermance, of Williamsport, Pa., which is attracting the attention of the wood-working public generally, and which is claimed to possess many new and valuable features heretofore unknown in machines of this kind. It is as rigid and steady as the inside molder, and is at the same time as convenient, and the parts to be changed or adjusted as accessible as the outside or overhanging molder. The frame is heavy, and is cast in one piece, and hence is not liable to be affected by undue strain, as by setting

As these places are most likely to accumulate ashes they speedily choke up, if openings are not provided for their escape.

Castor Oil as a Lubricant.

A correspondent of the *English Mechanic* writes as follows in a recent issue: "The Asiatic wire drawers have very long ago used this oil in preference to any other kind. Their dexterity is surprising: the wire for the Trichinopoly chains of gold and silver being like hair, and every good workman draws his own. A man made me a plate for the fine gauges from a flat rasp of English steel, which I still possess: he drew copper, zinc and brass equally well. This oil, being one of the cheapest in India, is used to soften harsh leather shoes and ropes. The fresh

filled, overheating and subsequent rupture takes place. With steam of higher pressure—or, in other words, of greater density, the influences that cause circulation are lessened, as the difference in weight of the ascending and descending columns of water is not as great.

Circulating plates, judiciously arranged so as to separate the various currents, to a certain extent remedy the troubles due to imperfect circulation, but their effect is limited; the best means, especially in boilers using high pressures, of insuring good performance, is to provide plenty of water surface and steam room. A good example of the method to be employed in boiling a troublesome mixture is shown by a process introduced a few years ago in connection

the low or navy boiler, where employed with forced draft, does not seem to be producing good results, judging by some reports of recent sea trials. There can be little doubt but that flame is driven nearly, if not quite, through the tubes by the air blast, and their whole length more or less actively engaged in evaporation. If the side water spaces are not sufficiently large to permit active circulation, it is difficult to see where the downward current is to be accommodated to the necessary extent for quickly replacing the water on the steam-raising part of the heating surface. Although in some text books it is the fashion to say that only the first foot or so of the tube length is efficient for steam making, that person would be a rash one who supported his theory by mak-

are four, have two cutting edges each, as shown in Figs. 3 and 4, the latter engraving also illustrating the manner in which they are let into the body of the tool. The sides of the cutters, it will be seen, have ribs which fit into corresponding grooves in the cutter head. Tightening and clamping nuts are fitted to the end of the spindle in the manner indicated. The reamer is very simple and substantial, and seems well designed to do good work. It will be put on the market by Messrs. Cranston & Co., 59 Park street, New York.

Locomotive Boilers at Sea.

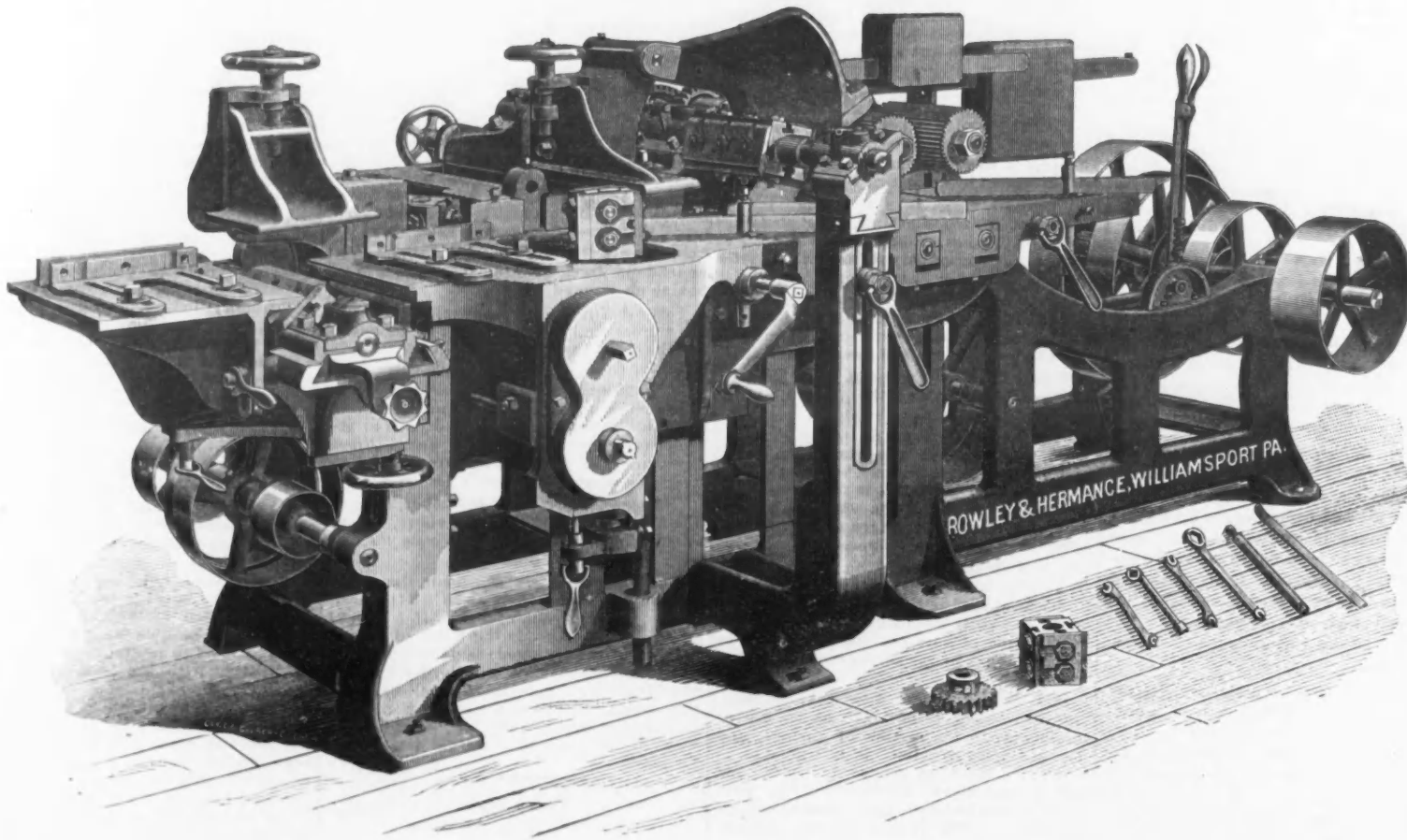
Referring to the recent disastrous experiences of English torpedo boats in a 100-mile race, a boiler explosion with fatal results having occurred on one of the vessels, *Engineering* says:

The accident to this boiler may have an important influence on the future of very high-speed vessels. There has always been a small and uninfluential body of marine engineers who have questioned the wisdom of sending the locomotive type of boiler afloat. The great and popular success of the torpedo-boat constructors has hitherto silenced these old fashioned cavillers, although they will doubtless now be heard speaking with additional complacency, and indeed their case is not so weak as many suppose. The torpedo boat has hitherto been a fair-weather craft. No doubt voyages have been undertaken in rough water, but in such cases the boiler has not been pressed—in other words, time has been no object. With picked crews and under favorable conditions, wonderful performances are registered; but the public hears little of the numberless failures that occur before these little vessels are tuned up to concert pitch. Were locomotive boilers fitted in ocean liners, so that failure would mean delay of mails and detention of passengers, we should be able to form a better estimate of their value, but it is only in exceptional cases when public attention is drawn to the performances, as in the race in question, that we hear of accidents not involving loss of life.

It has been complained that the boats were handed over to untrained crews, but *Engineering* points out that in the special case in question the officers in charge were men of acknowledged ability. "Indeed," says our contemporary, "the engine-room artificers of the Royal Navy are an exceptionally intelligent and capable class, of which the country may well be proud. If these men are not capable of handling the locomotive boiler afloat it is certain that torpedo boats are not very likely to play an important part in any future naval warfare, either in our own service, or, more certainly, that of any foreign power."

The activity in shipbuilding on the Lakes is increasing rather than diminishing. A contract has just been closed with the Globe Iron Works, of Cleveland, for a fleet of steel steamships for the St. Paul, Minneapolis and Manitoba Railroad Company. The contract calls for six boats, each to cost \$220,000. They are to be built after one model, 310 feet over all, 295 feet keel, 40 feet beam and 24 feet molded depth, with triple expansion engines; diameter of cylinders, 21, 38 and 60 inches by 42 inches stroke. Steam will be furnished by two boilers, each containing three furnaces, and with a working pressure of 150 pounds. The boats will form a line between Duluth and Buffalo. New vessels have also recently been contracted for and will be built at Bay City, Detroit and Buffalo.

Some new quick-firing guns of heavy caliber, intended for the British navy, have



IMPROVED MOLDER, BUILT BY ROWLEY & HERMAN, WILLIAMSPORT, PA.

on a weak or uneven floor. The feed is positive and powerful. The feed rolls are 6 inches in diameter and four in number, two above and two below; all are geared, and the upper and lower rolls are independent of each other. The gearing which drives the lower rolls is not affected by lowering the table to the full capacity of the machine. The arbors are made of steel, and are unusually heavy, and are fitted throughout with four slotted steel heads, an extra head being furnished with each machine. The boxes supporting the main arbors are so arranged that the wear caused by the belt forcing the arbor toward the countershaft is confined to the bottom of the box and does not affect the side or joint between bottom and cap, so that lost motion may be readily taken out by tightening down the cap. The belts which run the side heads do not pull on the caps of the boxes that support them. By means of a screw the spindle carrying the outside head can be set at any angle, and the head may then be moved out or in, without changing the angle. The bottom head, and both side heads are adjustable both horizontally and vertically. For raising and lowering the table a convenient device is provided, and the table is so securely clamped to the frame that it is as solid as the frame itself. By the use of heavy and accurately fitted arbors, a machine weighing 3600 pounds, and everything carefully and substantially made, a high degree of smoothness is imparted to the work.

A New Form of Drilling Machine.

The Pratt & Whitney Company, of Hartford, Conn., have now in use at their works an improved form of horizontal drilling machine designed by Mr. John W. Heyer. The drill which is used in this machine has an outward opening flute or channel extending along it from the point to the shank, and also a covered channel extending lengthwise of the drill and opening at or near the point that has its cutting lip of irregular profile. Combined with the machine is also a pump and a system of pipes, by means of which oil may be forced through the channel and flute past the cutting edge of the point of the drill, so as to carry out with the out-flowing oil the chips made by the drill in boring.

The Laxey Water-Wheel, Isle of Man, England.

The Laxey wheel is said to be the largest water-wheel in the world. It is used to pump water from the Laxey mines, on the Isle of Man, the water being raised 200 fathoms. The dimensions of the wheel are: Diameter, 72 feet 6 inches; breadth, 6 feet. It makes two revolutions per minute. It is an overshot wheel, and water to operate it is brought from the mountains, and ascends through a circular tower, from which it passes to the wheel through a horizontal duct.

Warping of Grate Bars.

To remove one troublesome complaint that frequently causes grate bars to warp, the *American Engineer* recommends having suitable space, or clearance, at each end of the bar. Grate bar bearers will prove more serviceable if they are placed a short distance from the end of the grate bar, leaving space so that whatever falls at the end may not lodge there. Some grate bar bearers are placed up to the bridge wall at one end and join the dead plate at the opposite end.

leaves of the castor-oil tree, too, are gathered, bruised, and rubbed in the hand, then stuffed tightly into stiff European boots, male or female, and so remain all night; the leather then becomes quite supple. For feeding large drills I like this oil mixed with soft soap.

The Elland Gas Engine.

A new gas engine is being put on the market in England under the name of the Elland Silent engine. The mechanism is said to be exceedingly simple, the results obtained being excellent. It has an ignition at every revolution, instead of at every two or three revolutions, as in the Otto and other gas engines.

Priming in Boilers.

In a recent article on priming in steam boilers the *London Engineer* says:

A very great deal of uncertainty prevails on this subject, and, considering the some times anomalous results that are observed, surprise cannot be felt. Plenty of steam room and good circulation seem to be the generally acknowledged conditions for securing a good result, but of these two probably the latter is the more absolutely necessary. A small amount of priming is experienced in nearly all boilers at times, which seems to arise from alteration in the surface tension of the water in the boiler, due to scum from earthy matters, which may be present alone or in combination with fatty acids; the trouble usually disappears quickly on the surface blow off being opened for a short time. In marine boilers priming is frequently experienced when changing water in passing from dock to river or from river to sea, and, of course, is in these cases confined to vessels using jet condensing machinery, or having leaky surface condensers, wherein the feed-water is contaminated by the outside water. Priming arising from these causes alone is, however, small in amount and easily controlled; but when it acts as an existing cause to the more serious form due to imperfect or bad circulation, the situation may be one of very great danger, as it is almost sure to occur when the fires are being urged. The circulation at low rates of steaming is frequently very fair in many badly designed boilers; it is when the final effort is to be made that the trouble arises. It may be said that this is only another way of saying that boilers should be made large enough for their work, which is perfectly true. Engineers, however, have seldom the weight and space at their disposal to adopt the principles of land boilers to locomotive or marine practice, and they have to consider how to get the most duty out of a given amount of material and space. The circulation of water in a boiler must depend entirely on the difference of density of those portions giving off the most and the least steam, the water being, as it were, honey-combed; therefore the necessity for allowing suitable water spaces at the less highly heated portions becomes obvious, so that gravitation may tend to supply those portions of the heating surface that are doing the highest duty, and when the water is in consequence least in average density in the water spaces. Water-tube boilers have failed from this cause as much as from structural defects, the difficulty of insuring a proper circulation through each of perhaps several hundred tubes being very great. In the case of such as become badly

with brewers' coppers, where an inverted funnel-shaped appliance is placed in the wort, reaching nearly to the bottom of the containing vessel. By this means all the steam, or very nearly all, is collected, and the wort, which ordinarily foams up as soon as it boils, is constrained to circulate with great rapidity, giving off its steam as the liquid flows over the upper and smaller part of the funnel, which is above the normal height of the fluid several inches. The liquid having parted with its steam in suspension, by its superior density displaces in its turn the lighter and ascending columns continuously. As affecting marine boilers this principle had been anticipated, and was in actual operation in some of Her Majesty's vessels. In these cases, as well as in some private ves-

ing a locomotive boiler with tubes, say, 2 or 3 feet in length. Boilers of a character tending in this direction are now afloat, but their performance does not seem to be encouraging. The practice among our leading torpedo boat builders is decidedly averse to short tubes in their boilers.

A New Expansion Reamer.

Of the various forms of expansion reamers which have been designed and put upon the market within the past few years, comparatively few have proved in all respects satisfactory, some lacking accuracy and others again being inconvenient to handle.

We take pleasure, therefore, in presenting on this page engravings of a device of this class recently designed by Mr. Hugh Cassidy, which apparently meets all practical require-

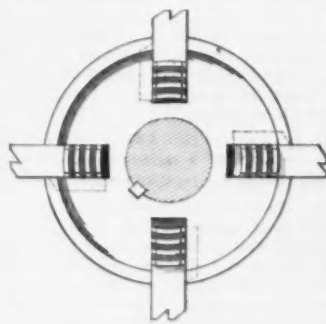


Fig. 3.—Rear and Side Views of Cutter Head.

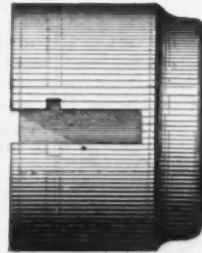


Fig. 4.—Enlarged Views of One of the Cutters.

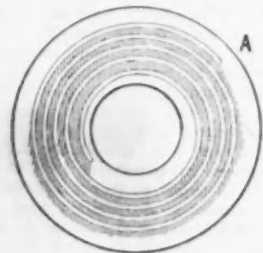


Fig. 2.—Grooved Adjusting Plate.

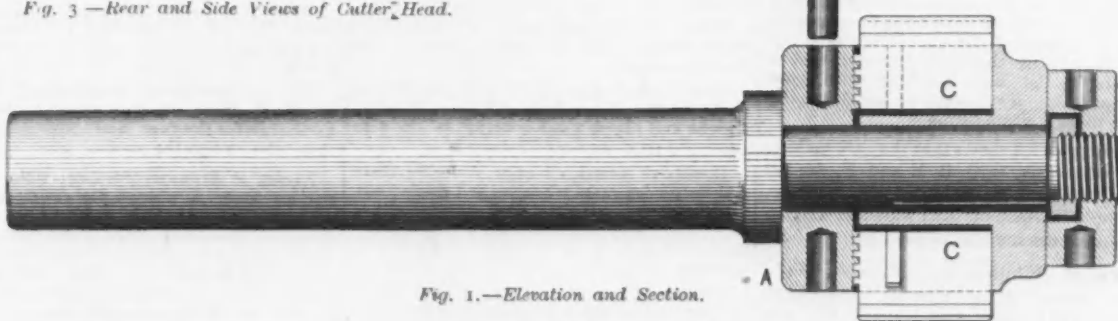


Fig. 1.—Elevation and Section.

A NEW EXPANSION REAMER, DESIGNED BY HUGH CASSIDY, NEW YORK.

sels where the system was tried, the result was, on the whole, very satisfactory. The curious property of injected grease encouraging priming in locomotive boilers and hindering it in marine boilers of the box form has often been noticed, and is only mentioned here as a curious paradox. On all sides it is agreed as of the first importance nowadays to keep grease out of the boiler as far as practicable, owing to the troublesome compound which it forms with any precipitated lime or other earthy substances. When deposited on the furnace crowns and tube plates great danger may arise. Even its presence on the boiler shell at or about the water level is considered by many engineers to produce priming, especially in locomotives when the water level is rather closer to the top than in some other varieties of boilers. The present practice of using short tubes in

ments of a convenient and useful shop tool. Fig. 1 represents the reamer partly in section, while the remaining illustrations show details of the cutters and expanding arrangement. The latter, it will be noticed, consists in having one of the end surfaces of the cutters CC furnished with suitably shaped teeth which engage with a spiral groove (see Figs. 1 and 2) cut in the surface of the plate A. It is obvious that as this plate is revolved in either one direction or the other the cutters are made to move either away from or toward the axis of the tool, the limit of outward travel for each cutter being $\frac{1}{2}$ inch, thus giving the reamer a total range of 1 inch from the smallest to the largest hole capable of being reamed. The value of this comparatively wide range of adjustment will be readily appreciated. The cutters, of which there

just been successfully tried upon the proof ground of Sir William Armstrong, Mitchell & Co., near Silloth, England. The first weapon tried was a 36-pounder improved rapid fire breech-loading gun of caliber 4.724 inches. This was fired with $7\frac{1}{2}$ pounds of powder. The weapon is made entirely of steel, its length being 14 feet $2\frac{1}{2}$ inches, length of barrel 35 calibers, and weight 34 cwt. Ten rounds can be fired in 47 seconds, giving a rate of fire six times faster than the present service of guns of the same caliber. The next gun tried was a 70-pounder, which was discharged about half a dozen times, both with 25-pound and 30-pound charges, at a speed of from eight to ten rounds per minute. According to the *Naval and Military Gazette*, London, the results were considered satisfactory.

THE WEEK.

The "Commercial Spirits Trust" is the latest combination, in which wine leading distillers in Chicago take the lead. It is alleged that the production of spirits is far in excess of the demand, and in order to properly adjust the supply, a compact has been signed to suspend distillation through the season of 1888. As to the "rubber trust," there are contradictory reports, as the smaller manufacturers of rubber hesitate in surrendering their interests to the control of those who at present are formidable competitors. The object of this trust, as explained by one of the parties interested, is to purchase direct from the natives of Brazil the raw product, thus saving the commission and profit now made by brokers and dealers. Brazil furnishes the bulk of the best quality of rubber used in the American market, and by making purchases direct, the trust would be able to control and regulate the prices of the raw material. The price of rubber goods has advanced 16 per cent. within a year, and the desire of manufacturers is to maintain the present prices.

There is an urgent demand at Castle Garden for men to work in the brass foundries and machine shops at Fort Wayne, Ind.

Vessel owners and masters who would avoid the necessity of discharging in quarantine at this port must not go alongside the "infected wharves" at Havana.

There is sharp rivalry between railroads and steamboats in the Texas trade, at St. Louis, New Orleans and intermediate points, inaugurating an era of cheap freights.

An accident occurred at the Roane Iron Company's steel mill in Chattanooga last week which resulted in the death of the engineer and the serious injury of another employee. The fly-wheel of a mammoth engine working blooming rolls burst and tore up the roof of the mill, fortunately not injuring the machinery much. The loss will be about \$5000, and a delay of three to four weeks in work will be occasioned.

The loss caused by the fire at the Standard Oil Company's works, at Constable Hook, will not exceed \$200,000. The lost property consists of three tanks wholly destroyed, one partly destroyed, a wooden storehouse two stories high and 50 feet square, a wooden storehouse two stories high and 200 feet square, a bulkhead 300 feet long, four piers 150 feet long, 9500 empty barrels, and about 10,000 barrels of oil, naphtha and benzene.

Mayor Hewitt favors the construction of a municipal building that shall also serve as a criminal court house, and suggests that a suitable location would be the present site of the City Hall.

Government contracts for deepening the channel in Raritan Bay and building a pile dike at Saugerties Harbor have been awarded, the first to the Atlantic Dredging Company, the latter to Henry Du Bois's Sons, of New York.

The granting of rebates to shippers was, before the passage of the Interstate law, the favorite practice of the railroads who desired to cut rates and discriminate in favor of those controlling large assignments. This is now prohibited, but some of the Western roads have hit upon a plan by which they may still discriminate in favor of certain shippers. Instead of granting rebates, it is claimed these roads are now paying commissions to parties securing them business. While these roads pretend to pay such commission to freight solicitors only, it can be seen that commissions can be paid to any member of a large firm on the pretense that such party is a freight solicitor, and consequently discriminations can be practiced in favor of certain firms to the same extent as if rebates were still in vogue.

The Mexican *Financier* intimates that the Diaz Government has about given up its efforts to obtain a reciprocity commercial treaty with the United States, remarking as follows: "We regard the reciprocity treaty as of vastly less value now to the United States than it was before the present revised tariff was adopted, and we do not think that the Government would do wisely to enter anew into negotiations for another and ampler treaty, unless it had some reasonable certainty that the House of Representatives at Washington would pass an enabling act to put the treaty in operation after its ratification by the Senates of the two countries. It is a waste of time and energy to negotiate treaties which cannot be made operative."

Judgments in considerable amounts have been entered against the Globe Tack Works, in Norristown, Pa., and C. A. Godcharles & Co.'s nail works at Milton, Pa., but in both cases the embarrassment is supposed to be temporary.

James Rees' Duquesne Engine Works, Pittsburgh, has contracts for building a stern-wheel steamboat for parties in Baltimore and a stern wheel boat for the Arkansas River Packet Company, indicating the revival of an old trade as a consequence of the Interstate law.

A Madrid dispatch says the Government have decided to abolish the Cuban export duties on sugar, molasses and spirits. The Cuban sugar planters had previously insisted that their ruin was inevitable unless the duties were removed. The sugar interests

of Brazil are likewise in price and the planters have resolved to organize in favor of negotiating commercial treaties with sugar consuming countries, and especially with the United States, for the purpose of increasing the consumption of Brazilian sugars. Brazil at present exports annually from 200,000 to 300,000 tons of sugar, corresponding to about one-fourth of the quantity consumed in the United States.

J. H. Starin contradicts a report that Glen Island had been bought for speculative purposes by saying that he would not consider an offer of \$2,000,000.

The contractors have sent dredging steamers and machinery to remove the bar at Sandy Hook, under the appropriation of \$100,000 for this object.

The east shore cantilever arm of the Poughkeepsie Bridge is completed and in place, and men are engaged in putting up the false work for the west shore cantilever arm. The engineer's schedule shows that one-half of the entire bridge will be completed by the middle of November, or that part from Pier 3 in the river to the west anchorage pier on the hill on the west shore. The false work now between Piers 2 and 3 is 100 feet in height, and this week the highest traveler in the world is to be placed upon it for the erection of the truss and cantilever in the river. This traveler will be 96 feet high, 55 feet wide, and will contain 85,000 feet of lumber. Two Westinghouse engines will be placed in the center of the false work to hoist the heavy steel and iron sections, and the traveler located on rails will move the sections along to place.

M. De Lesseps is not quite sure that the Panama canal will be finished in 1889. Most engineers will think that he is tardy in reaching this conclusion.

The annual report of the collector of Philadelphia for the fiscal year ended June 30 shows that the total value of imports was \$40,293,863, which is an increase of \$3,732,004 over those of 1886, and \$9,850,356 over the imports of 1885. The duties collected amounted to \$17,660,713.25, an increase of \$3,117,806.02 over last year and \$5,399,967.44 over 1885. "This," says the *Record*, "is considered a most remarkable showing, as the increase is out of all proportion to the business of other ports." The exports were valued at \$35,361,000, against \$33,714,000 for 1885.

Three cargoes of Hawaiian sugar are en route for New York around the Horn, and another vessel has been chartered, the refineries at San Francisco not being able to work off the entire product.

Manitoba expects to have a surplus of 10,000,000 bushels of wheat for export.

A larger share of the iron-ore trade will go to the Pennsylvania Railroad, now that fine terminal facilities have been obtained at Fairport Harbor, Lake Erie.

The East River Ferry Company has transferred all its property to the Metropolitan Ferry Company for an expressed consideration of \$2,750,000. The property includes real estate in this city and Brooklyn, all its ferryboats, ferry-houses and their contents, and all the company's present franchises. Nine boats are covered by the deed.

The Master Builders' Exchange, of Philadelphia, are to have new headquarters, at a cost of \$75,000.

A statement issued by the Post Office Department shows an increase of about 8.3 per cent. in the gross receipts of the 30 largest post offices in the country for the quarter ending June 30 over the amount for the corresponding period last year.

The Treasury Department has been called upon for a decision as to the meaning of the words "actual shipment," as used in section 2004, where it is prescribed that duty shall be estimated and collected upon the value of the merchandise on the day of actual shipment. In the case in point, presented by the Collector at San Francisco, certain merchandise was placed on shipboard at Calcutta, November 30, 1886, but the importing vessel did not actually sail from that port until January 9, 1887, when the market value of the cargo had increased to a certain extent. The main question involved is whether the market value of the goods should be taken at the time of the actual sailing of the vessel for the purpose of assessing duty, or at the time when the goods were placed on shipboard. The Department has decided that the time of exportation must be deemed and taken to be the date at which the merchandise leaves the foreign port for its destination in the United States, which period may ordinarily be established by the production of the clearance granted to the vessel at the foreign port and the declaration of the master under oath at the time of entry of the date when the vessel sailed.

Now that the trunk line reclassification of cases cotton goods as third class has gone into effect, it will be of interest to note the reductions made in the shipment rates of cases cottons by the rail and water and all-water transportation companies between New York and Chicago as follows:

Route.	Class.	Rate.	Time.	Insurance.
All-rail.	3d	20c. pr 100 lb.	4 1/2 days	No
Rail & w't.	3d	20c. pr 100 lb.	5 days	2c. pr \$100
All-water.	3d	25c. pr 100 lb.	15 days	2c. pr \$100

The above table, when compared with that in operation prior to the 18th inst., shows that the reclassification has reduced the rate on this particular grade of goods in

cases packages 25 cents per 100 pounds all-rail, 17 cents rail and water, and 10 cents all-water transportation.

The Detroit councils awarded a contract for building the Belle Isle Bridge to the Detroit Bridge and Iron Works for \$280,000.

It is reported in Duluth, Minn., of a pretty good authority, that J. J. Hill, president of the Manitoba Railroad Company, has contracted with the Globe Iron Works Company, of Cleveland, for six steel steamers of large capacity for Duluth and Lake Erie trade, and that he is now in Detroit figuring with parties there for six more. The vessels are to be ready for next season's business.

Girard B. Allen, one of the leading business men of St. Louis, and founder and president of the Fulton Iron Works of that city, died on the 21st inst., at Richfield Springs, N. Y. He came to America from Ireland in 1836, when only 23 years old, stopped one year in New York City, where he worked at the carpenter trade, and then came to St. Louis and located permanently, just 50 years ago. He grew with the town, his carpenter shop became a factory, saw-mills and a foundry were added, until at his death he was the second wealthiest citizen of the State. For years he was president of the Fair Association, and in 1851 was president of the Merchants' Exchange. His real estate is valued at \$3,000,000 and his bonds and stocks at as much more.

Alleged unjust freight charges on small lots of merchandise compared with carload lots was the subject of inquiry before the Interstate Commerce Commission on Thursday last. Complaints from St. Louis were followed by a statement from the New York Board of Trade and Transportation, through F. B. Thurber, who represented that the trunk lines classifications since the enactment of the Interstate law largely increases the number of articles upon which all differential rates are imposed when shipped in less than carloads. Substantially, the discriminations are thus made in favor of shippers which were formerly made by means of rebates and drawbacks which the Interstate Commerce law was designed to prevent. The circumstances are greatly aggravated over those complained of at St. Louis. More than half of the cars of the Trunk Lines go West empty, and no cause exists for such discrimination. He asked that the question be not decided until the commission shall have had time to hear and consider it in all of its bearings. It touched the very foundation of rate-making principles, and it would be better to postpone its decision until autumn rather than decide hastily. He filed comprehensive printed petitions upon the subject. T. E. Greene, manager of the Merchants' Freight Bureau, of New York City, joined Mr. Thurber in urging the Commission to investigate this matter thoroughly.

W. A. Freret, of Louisiana, is appointed supervising architect of the Treasury, at a salary of \$4500 per annum.

The Retail Shoe Dealers of the United States held their annual convention at Chicago, closing with a banquet. One of the orators on the occasion enjoined his hearers to "black list the firms who use shoddy material or who mark up their sizes," giving assurance that in so doing the manufacturers would stand by them, 99 out of 100. J. K. Brown, of Worcester, Mass., the president of the national association, denounced in unmeasured terms the rubber goods monopolists, and suggested the organization of a stock company, composed of retail dealers, to manufacture rubber goods and not "combine."

The newly organized Builders' Exchange, of Cleveland, Ohio, elected Col. A. McAllister president.

The Junior Order of United American Mechanics, at their meeting of the State Council, in Erie, Pa., adopted a memorial to Congress, asking that a per capita tax be imposed on foreign emigrants, and that the landing of foreign papers at American ports be prohibited under heavy penalties; also that foreign born residents hold their legal citizenship 21 years before becoming eligible to public office.

Lightning exploded 10 tons of powder belonging to a coal company at Streator, Illinois, killing one person, injuring many others, and blowing 50 houses into fragments. The powder-house was made of brick and cement, and incased with sheet iron, which aggravated the force of the explosion. The loss of property is estimated at \$100,000.

The Secretary of the Treasury invites proposals for a steel torpedo boat to cost not above \$90,000, and to have the highest attainable speed.

The Cunard Steamship Company have filed a petition in the United States District Court at New York, asking that the liabilities of the company on account of the loss of the Oregon be limited under the Revised Statutes to the value of its present interests in the vessel and freight, which is about \$5000.

A Sheffield paper speak of large orders in the market for steel sleepers, principally for railways in India. A Welsh firm is now executing a contract for 250,000. The prices now are \$25 @ \$30 per ton.

Respecting the costs of the coke-workers' strike, a Pittsburgh dispatch says: The strike began on May 3. Some of the time it shut 13,000 men out of work, but since the Carnegie Works and a few smaller ones

have granted the 12 1/2 per cent. advance asked for only 8000 to 9000 men were idle. The loss of wages foots up a round \$1,000,000, reckoning the average pay of the men at \$1.60 a day. Besides this, the Knights say they have spent \$17,000 from their relief fund; but they declare their treasury fuller than when the strike began. The strike was declared against the decision of an umpire to whom the question of wages was referred. It has been condemned by Powderly, Bailey and Carleton, of the National Executive Board, and other labor leaders who regarded it as a breach of faith.

The Government of Costa Rica is in correspondence with Paris contractors with reference to a submarine cable between Central America and New York City, via the West India Islands.

One of the compressors of a De La Vergne ice machine, at the Bergner & Engel brewery in Philadelphia, burst on Saturday afternoon. The escaping ammonia fumes injured seven employees, three of them dangerously. Mr. Engel said that the compressors were guaranteed to withstand a pressure of 250 pounds, and that 180 pounds is about the average at which the machine is worked. There were about 1500 pounds of ammonia in the two De La Vergne machines at the time of the accident.

The season of lake navigation is nearly half gone, and there remains an enormous amount of freight to be moved, exclusive of the new wheat crop.

Contracts have been closed for the erection of zinc smelting works at Nevada, Mo., for Robert Lanyon & Co., of Pittsburgh.

The Chief of the Bureau of statistics reports that the total number of immigrants arrived at the ports of the United States from the principal foreign countries except from the Dominion of Canada and Mexico, during the 12 months ended June 30, 1887, as compared with the same period of the preceding year was as follows: Twelve months ended June 30, 1887, 484,116; for 1886, 328,895. Germany led with 106,559 for 1887 to her credit, with England and Wales next, showing 74,020, and Ireland third with 63,130.

The works of the Fowlerville Bolt and Nut Company at Fowlerville, Livingston County, N. Y., were totally destroyed by fire on Saturday. The loss is estimated at \$30,000, partially insured.

American capitalists have organized the Mexican International Steamship Company, under the laws of Mexico, to run steamers between ports in that country and New York via New Orleans, and expect that carrying the Mexican flag will prove to be an advantage.

The Interstate Commerce Commission during the past week determined two questions raised in behalf of the claims of commercial travelers, deciding that common carriers may continue to issue mileage tickets at just and reasonable rates, but that they must be sold to all persons at the same rates. The commission makes bold to declare that drummers "are not privileged to ride over railroads at lower rates than are paid by other persons."

Some of Judge Hilton's investments made since the death of A. T. Stewart have proved unfortunate. The grand park of 700 or 800 acres on Shrewsbury River facing Sandy Hook was expected to form the nucleus for many of New York's most opulent citizens, where they could build on a magnificent scale, but through a defective title one of the fairest sites in the country is returning to a condition of primeval wildness. In like manner there are several villages in New York State where fabrics were manufactured by Mr. Stewart which are now forsaken, while the extensive mills are falling into decay. One of these is near Catskill, which is described as "a picture of desolation."

The fleet of American-built ocean steamers is gradually enlarging, and each successive year demonstrates more fully the capability of American mechanics whether in the shipyard or shop. The lines of American steamers now successfully running to Cuba, Venezuela and other ports in Central America; also to Brazil, not to speak of ports on the Pacific, comprise a number of vessels, which, for elegance, speed and economy of fuel, are second to none. The best evidence of success, both mechanically and commercially, is afforded by the net revenues derived in numerous instances. Still another 3000-ton iron steamer is about to be contracted for by the United States and Brazil Steamship Company.

The South Boston Iron Works object vigorously to the proposed removal to the United States Arsenal, at Troy, N. Y., of the lathes and other machinery owned by the Government, which has, heretofore, been kept at South Boston. The machinery is needed in Boston in order that the company may finish contracts now under way.

W. K. Vanderbilt's Idle Hour farm, at Islip, on Great South Bay, L. I., comprises 2000 acres. The mansion has a complete equipment of electrical fire, alarm and dingling bell apparatus, including a thermostat of extreme sensitiveness. It has been found impossible heretofore to come within less than a degree of the exact amount of heat, but this machine indicates to within an eighth of a degree. It is set at 110°. When the heat of a room reaches

that point an alarm is given. The thermostat is made of steel and copper, soldered together with silver. It will bend 100° with the heat and resume its normal condition when the heat is withdrawn. It contracts within 3 inches a piece of the prepared metal 14 inches long. An artificial island, formed by cutting channels, will cost \$250,000.

The introduction of a cable road on Tenth avenue in this city is said to have increased the value of property in that neighborhood threefold within a year, and the big bridge in course of construction at 181st street, providing an entry into Westchester County, will still further hasten the movement of population in that direction.

W. J. Hammond & Co., Limited, of the Pennsylvania Iron and Steel Works, of Pittsburgh, on Monday called a meeting of their creditors. The financial troubles of the company are directly caused by a fire, which destroyed its mill, a week ago. A large part of its liabilities, which are about \$335,000, consist in the cost of the recent enlargements and improvements of the plant. The fire occurred at a time when the trade in the branch of the iron business in which the company is engaged is just beginning—namely, between July and January. The company is, therefore, practically cut out of a year's business, as the mill could not well be rebuilt before January. Meanwhile, the company's paper is falling due at short intervals. Under the circumstances the company thought it proper to meet its creditors at once rather than undertake the responsibility of rebuilding the mill and of continuing the business without such consultation.

The extremely low estimates of John Roach in his bids for the four new steel cruisers ordered by Congress a few years ago, awakened the first suspicions respecting the possibilities of American shipbuilding. At the recent convention of the Shipping League, in Chicago, Congressman Geo. E. Adams, of that city, said: "It was currently reported at the time that if the work could have been thrown open to competition again, Mr. Roach's competitors would have seized the opportunity to revise their estimates in the light of his superior knowledge. That is to say, the action of Congress, in ordering this large amount of work to be done in American yards, with American material, brought to light the fact that steel ships could be built in this country far more cheaply than had been supposed possible. The action of Congress, therefore, had the practical effect of materially reducing the cost of producing, in this country, steel plates of which the hulls of merchant steamers, as well as of cruisers, are heretofore to be made. In the words of Secretary Chandler: 'The demonstration that such material can be here produced at moderate cost, is of itself of great importance in the progress of our mechanical industries.' In building the new American navy we are taking a long step toward the restoration of our mercantile marine."

On the lands of the Lake Superior Iron Company, 4 miles northwest of Ishpeming, an outcropping of quartz was discovered not long ago, highly charged with thin leaflets of gold. For the last few months the company have been quietly at work sinking a shaft in the vein, occasionally taking out large pieces of quartz worth from \$50 to \$200 per pound.

The efforts of the Baltimore and Ohio Railroad to secure terminal facilities on Staten Island appear fully in proceedings in the Supreme Court of this city designed to place the company in possession of real estate to the value of \$200,000, which Reon Barnes and others of the Staten Island Transit and Terminal Company had been authorized to purchase with the plaintiff's money, but who, as alleged, issued stock in their own behalf, and declined to make a transfer except upon the further payment to them of \$50,000. John H. Post, president of the Transit and Terminal Company was ordered last January by the court in Richmond County to make the conveyance; failing to do this, the further aid of the courts is invoked.

Contracts will soon be let for material to build 2500 tube-iron freight cars that will have a capacity of 60,000 pounds.

President Cleveland has signified his acceptance of an invitation to visit St. Louis. He had previously promised to be in Atlanta, October 1, and will therefore take that fact into consideration in the new engagement.

The President has appointed Charles Chaile Long, of New York, to be Secretary of Legation and Consul General at Corea.

The Chicago, Burlington and Quincy have closed a contract with the Union Pacific Bridge Works for another bridge across the Missouri River to connect their Red Oak and Hamburg division with the line from the river at Nebraska City through Lincoln.

The commerce which seeks an outlet at Sault Ste. Marie is already larger than that accommodated by the Suez Canal. In 1855, when the first lock was put in operation, the tonnage of vessels passing through was about 100,000. In 1882, with new locks, it rose to 2,000,000 tons, and in the season of 1886 it was 4,527,759 tons.

Four lots on Broadway adjoining the Washington Building, near the Battery, have passed into the hands of operators in real estate, and the erection of an other 12 story office building is said to be in contemplation.

Trade Report.

NEW YORK.

American Pig.—The conditions prevailing in the Pig Iron market this week have changed so little since our last writing that there is really little occasion to present a fresh report. The aggregate sales for the week were not particularly large, and what business was done was in small lots and in a quiet way. From some quarters we learn that rather more inquiries are being made, but they have not resulted in any increase in actual business. The general situation is considered strong and prices are firm at previous quotations. Good No. 1 Foundry is not plentiful at present, but demand is fairly large, and as a consequence the market shows considerable strength. In Southern Irons there is practically nothing doing at present, and as they are pretty generally sold ahead it is not expected that they will prove an important factor in this market till late in the year at least. In the absence of transactions for the time no quotations can be given in Southern pig. We quote standard brands No. 1 Foundry, \$21 @ \$21.50; No. 2 Foundry, \$19.50 @ \$20.50, and Gray Forge, \$17 @ \$18, with outside brands of Foundry Irons available at 50¢ @ \$1 less.

Scotch Pig.—There is nothing of interest to report concerning this market. But little trade is doing, as buyers are well supplied at present. Prices, however, are firm, and but little change since our last report. We quote: Coltness, \$22.75 @ \$23; Glengarnock, \$20.75 @ \$21.25; Shotts, \$22 @ \$22.50; Gartsherrie, \$21.25 @ \$21.50; Carnbroe, \$21 @ \$21.25; Summerlee, \$22 @ \$22.25; Dalmellington, \$20.75 @ \$21, and Eglington, \$20. @ \$20.50.

Spiegelisen and Bessemer Pig.—No transactions are reported in either Spiegelisen or Bessemer Pig. We hear of German Spiegelisen offered at \$26, and English may be quoted at \$26.50 @ \$27. Bessemer Pigs quiet and prices unchanged.

Bar Iron.—More or less inquiries are in the market for Bar Iron, but actual transactions continue of about the same volume as heretofore. The mills are well filled up with orders. We quote Common, 1.85¢ @ 1.9¢; Medium, 1.9¢ @ 1.95¢, and Refined, 1.95¢ @ 2.25¢, on dock.

Structural Iron.—No very large orders are reported as having been booked during the week under review, and, in fact, the mills are not in a position to accept work, as they have all they can attend to. As a rule, the mills are booked ahead from at least four to six weeks and are not anxious to take orders; and, in some instances, work has been refused. The excessively hot weather of the past few weeks has interfered with production to a considerable extent, as has also the shutting down of the mills during part of July for repairs. The result is that the market is in an excellent condition and prices are firmly held. We quote for large quantities: Angles, 2.40¢ @ 2.50¢; Tees, 2.75¢ @ 2.80¢, and Channels and Beams, 3.30¢, base on dock.

Plates.—The conditions in this market are essentially the same as last reported. The mills are all well supplied with orders, and it is very difficult to get work done for early delivery. Prices show an increased firmness, but there is little change to notice. We quote for round lots of Common or Tank, 2.50¢ @ 2.62½¢; Refined, 2.50¢ @ 2.60¢; Shell, 2.8¢ @ 2.9¢; and Flange, 3.5¢ @ 3.8¢; Extra Flange, 4.25¢ @ 4.50¢. For Steel Plates quotations are as follows: Tank, 2.75¢ @ 2.9¢; Ship, 2.9¢ @ 3¢; Shell, 2.9¢ @ 3.15¢; Flange, 3.25¢ @ 3.50¢, and Fire-Box, 3.75¢ @ 4¢, on dock.

Billets and Blooms.—There is nothing doing in this market, and foreign prices are strengthened during the past few days and we now quote \$31.50.

Wire Rods.—Considerable business is being done in Wire Rods in lots of 1000 and 2000 tons. During the week transactions aggregated something over 5000 tons, and there are many inquiries still in the market. The buyers who have been holding off for some time are now compelled to purchase, which accounts for present activity. The demand comes principally from the West. The market may be quoted: \$41.50, buyers to take risk of duty.

Steel Rails.—There is no change to notice in prices, which remain the same as a week ago. The works are booked ahead late into the fall, and it is consequently difficult to get early deliveries. The hot weather prevailing also adds to the difficulty by curtailing the output. The meeting of the makers is to be held at Long Branch next Tuesday to arrange allotments for the coming year. A fair amount of inquiries are in the market, but none for very large lots. Of the 28,000 tons of Rails, which we mentioned last week as sold by an Eastern mill, only 10,000 tons are to be supplied by the American concern, the remainder of the order going to England. We hear of a sale of 4500 tons having been made by an Eastern mill on private terms during the week under review. We are informed by Mr. B. G. Clarke of the Lackawanna Iron and Coal Company that they have sold 20,000 tons of Rails in different lots during the week, of which 10,000 tons are going to California, and the remainder to the West and South. We also hear from the same source of inquiries hav-

ing been made for next year's delivery. We quote \$38.50 @ \$39 for early delivery, \$38 @ \$38.50 for fall, and \$37.50 @ \$38 for late fall and winter work.

Old Rails.—But little business is being done in Old Rails, and the few sales that were made were only of small lots. Inquiries are more or less plentiful, particularly from the West, but the prices offered by buyers do not meet the figures named by the sellers. But few Rails are arriving, and the stocks here are light, which, of course, tends to give strength to the market. It is reported that a sale of 1000 tons Double Heads has been made for shipment at \$24.25, ex-ship New York, duty paid. We are also informed that \$24.25 were offered for some 600 tons of American Tees, but refused. In a general way the market may be quoted at \$23.50 @ \$24 for Tees and \$24 @ \$24.50 for Double Head.

Scrap.—There is no demand to speak of in this market, and but few sales are being made. Holders are asking \$21 @ \$22 for Yard Scrap, and we hear of a selected lot of Yard Scrap having been sold at \$22.75.

Railroad Fastenings.—Spikes are quoted 2.50¢ net; Angle Fish Bars, 2.1¢ @ 2.25¢; Steel Angle Bars, market weak, \$2.20 @ \$2.30; Bolts and Nuts 3¢ @ 3.2¢, and Bolts and Hexagon Nuts 3.2¢ @ 3.3¢.

Metal Market.

Copper.—The market has been quiet during last week, but in reality very strong; indeed, transactions would have been much larger if holders had not asked considerably higher rates; the attempt to bring out cheap cash lots having failed, however, the market during the last 24 hours has become much stronger. For large lines of August, September and October delivery, 10.70¢ @ 10.72½¢ has been bid and refused; for 200,000 lb, September delivery, 10.3¢ has been done, and that price remains bid, and only odd lots are obtainable at 10.80¢ for October, November and December, 10.85¢. Spot is held at 10.3¢, which is slightly above its value. By way of winding up, we may state that deliveries for future months were anticipated and paid cash for, which explains the strength of the market. Manufacturers want considerable Lake Copper, but cannot yet make up their minds to buy freely. While this is the case the mining companies have very little to sell, and hold for 11¢. At the close we quote, spot, 10.70¢; July and August, 10.3¢, and September and October, 10.85¢, altogether about 40,000 pounds Lake having changed hands during the week at 10.70¢ @ 10.75¢. Before calls, 200,000 pounds September sold at 10.3¢ at the Metal Exchange. Chili Bars stood in London on July 21, \$40; July 22, \$40. 2/6; July 25, \$40. 5/; July 26, \$40. 2/6, and this morning, \$40, while Best Selected did not swerve from \$14. 15/. According to Messrs. James Lewis & Son, Liverpool, the import of American Copper into Liverpool and Swansea from January 1 to July 16 was 5376 tons Fine, against 7000 same time last year; into England and France from all sources, 44,180, against 55,210, while the deliveries were 52,136, against 49,224.

Tin.—The market has daily advanced, owing to the large absorption by consumers, principally out West. Our arrivals have meanwhile been quite fair, but the scarcity of spot Tin has been so great that the bulk of arrivals has been shipped away into the interior, and only a very small portion has gone into warehouse to meet old contracts for July delivery. There have been taken during the week altogether from 350 to 400 tons, as follows: At from 23.20¢ to 23.40¢ for about 150 tons, July; at 23.10¢ @ 23.35¢ for about 200 tons, August, and about 100 tons September and October at 23.05¢ and 22.85¢ @ 22.90¢. Spot Tin remains quite scarce at 23.60¢ generally asked, but it is possible to pick up odd 10-ton lots on dock at five points less to save expenses. Before calls, 10 tons August sold at 23.3¢ at the Metal Exchange. London cables this morning, spot Straits, \$105. 2/6, and three months, \$104. 15/. Shipments of Tin from the Straits Settlements to the United States during the first five months, 32,139 piculs, against 26,067 in 1886; 16,051 in 1885; 24,969 in 1884; 38,210 in 1883 and 44,261 in 1882. Tin Plates—Have been strong, owing chiefly to the small supply here, the difficulty being to get delivery from the works in Wales, where the drought continues. The demand here is by no means excessive, otherwise prices would still be much higher than they are. We quote at the close, in large lines: Siemens-Martin Steel, Charcoal Finish, \$5; Coke Finish, \$4.65; Terns, \$4.30, and Coke Tins, \$4.45 @ \$4.55. The demand was chiefly run on 20 x 28 Terns and 14 x 60 Coke Tins, both being scarce. Liverpool quotes Coke 13/6, and Charcoal 15/ @ 16/. Shipments of Tin Plates from England during the first five months, 145,072 tons, against 143,852 in 1886, and 127,949 in 1885, of which to the United States 109,940, against 116,567 and 97,680; to British North America, 6081, against 4011 and 4848.

Lead.—Some 500 to 800 tons Common Domestic were taken during the week in this market at \$4.65 @ \$4.67½, purchased almost wholly by the principal operator, and nothing can now be had under \$4.70. There is hardly any consumptive demand to speak of at present. At St. Louis the price is \$4.45 @ \$4.47½ and at Chicago \$4.50 @

\$4.55. It seems that the chief operator is an active purchaser on the other side likewise, causing an advance there of 7/6 2/6 ton, Soft Spanish now being cabled £12. 2/6 and English Pig £12. 7/6. Manufacturers of Lead may be quoted in this city as follows: Pipe, 7¢; Sheet, 7½¢; Tin-lined Lead Pipe, 15¢; Block Tin Pipe, 40¢; Drop Shot, \$1.40; ditto, 5 lb, 33¢; Buck and Chilled, \$1.05; ditto, 5 lb, 38¢—all less the usual trade discount.

Spelter and Zinc.—A good steady jobbing demand for Common Domestic Spelter has continued to prevail at 4.52½¢ @ 4.75¢ as to brand, while Silesian remains 4.85¢ here and £14. 12/6 in London. Bertha Refined we quote 8¢. Sheet Zinc is moving off steadily at 6¼¢ @ 6½¢, Domestic.

Antimony.—Hallett gave way in London from £36 to £35; we quote the same steady here, 8½¢ and Cookson 9¢ @ 9¼¢.

New York Metal Exchange.

The following sales are reported:

WEDNESDAY, July 20.	
35,000 lb Lake Copper, September.	10.70¢
25,000 lb Lake Copper, Oct.	10.75¢
THURSDAY, July 21.	
10 tons Tin, August.	23.05¢
10 tons Tin, July.	23.20¢
10 tons Tin, July.	23.20¢
10 tons Tin, spot.	23.35¢
FRIDAY, July 22.	
10 tons Tin, August.	23.15¢
10 tons Tin, September.	23.00¢
10 tons Tin, September.	23.05¢
10 tons Tin, October.	22.85¢
10 tons Tin, August.	23.15¢
10 tons Tin, August.	23.15¢
32,500 lb Spelter, spot.	4.52½¢
SATURDAY, July 23.	
10 tons Tin, October.	22.85¢
MONDAY, July 25.	
10 tons Tin, July.	23.25¢
30 tons Tin, July.	23.30¢
20 tons Tin, Sept.	23¢
10 tons Tin, August.	23.35¢
10 tons Tin, August.	23.25¢
10 tons Tin, August.	23.25¢
TUESDAY, July 26.	
10 tons Tin, July.	23.40¢
20 tons Tin, August.	23.35¢
10 tons Tin, September.	23.05¢
WEDNESDAY, July 27.	
10 tons Tin, August.	23.25¢
200,000 lb Lake Copper, September.	10.75¢

Philadelphia.

Office of The Iron Age, 220 South Fourth St., PHILADELPHIA, July 26, 1887.

Pig Iron.—There is not much change to notice this week, the general position being about as stated in recent reports. In some directions the market looks firmer, and is firmer, but in others they appear to be still accepting business at quotations current during the latter part of June. The tendency of prices, however, is toward greater firmness, and unless something unforeseen is sprung on the market the chances are that quotations a month hence will be higher than they are to-day. No material change is expected, but \$18 at tide is likely to become a firm quotation for Mill Irons, with possibly a similar appreciation in Foundry Irons. The one feature upon which there is a perfect unanimity is, that prices are not going to be any lower this year, and if it can be avoided leading makers do not intend that they shall be much higher. Stocks are light, but production is large, so that without any danger of accumulation there is likely to be plenty of Iron at about current prices. Consumption, which has been steadily increasing since 1885, promises to take another new start, so that the last half of 1886 may show the heaviest consumption we have ever had. The indications are certainly very promising, and although the reaction must come some time, and, perhaps, sooner than expected, there are no signs of anything of that kind at present, and even conservative people are of opinion that there will be an extraordinary business this fall. Sales during the week have been moderately heavy; buyers are prepared to stake large lots at \$17.50, at tide, for good Mill Irons, but they are not plenty at that figure, the majority of good brands being held at \$18. Business is therefore somewhat restricted, but buyers seem more inclined to cover their requirements even though some slight advance has to be paid. Foundry Irons are well in hand, with \$21 for No. 2; some of the more favorite brands bring \$21.50 to \$22, and all grades may be considered firm at the price above named.

Foreign Iron.—Sales of Bessemer have again been closed, amounting, all told, to about 40,000 tons during the past two weeks. Prices have not been made public, but \$20 is within a small fraction of the figure, with \$20.25 asked for further shipments. Spiegelisen is dull and nominal at \$27.50 for 20%.

Blooms.—There is more demand for Steel Blooms, and sales of about 4000 tons Rail Blooms have been made at about \$29.50. Soft Steel Blooms are wanted at about the same figures, but foreign markets are higher, with asking prices about as follows, say: Rail Blooms, \$29 @ \$30; Nail Slabs, \$30 @ \$31; Sheet-Irons Billets, \$32 @ \$34; Charcoal Blooms, \$53 @ \$54; Runout Anthracite, \$45 @ \$46; Scrap Blooms, \$38 @ \$39 2/3 "bloom" ton.

Muck Bars.—There is more inquiry for Bars, but it is difficult to effect sales at over \$31.50, at mill, although for some good deliveries \$32 is quoted, firm.

Bar Iron.—There is a gradual revival of interest in this department, and plenty of business could be had at June prices. Mills are tolerably well supplied with orders, how-

ever, and in taking more manufacturers feel that they ought to have better prices, and are getting an advance of probably half a tenth. The majority are now asking 2.1¢ for Best Refined Iron, with large orders offered to makers of Best Iron at 2¢. A considerable business has been taken at about that figure, some at 2¢ @ 2½¢ to 2.05¢, but there are few, if any, who would sell at 2¢ now, unless the specifications were of a specially desirable character. Skelp Iron is wanted, but as yet the prices offered are not up to what the mills feel warranted in accepting, say, 1.9¢ @ 1.92½¢, bid, and 1.97½¢ @ 2¢ asked.

Plate and Tank Iron.—There is a very good demand for Plates, and mills are all full of work. Steel Plates are also in active demand, but prices are so irregular that it is almost impossible to quote them with exactness. Tank Iron has been sold in good-sized lots, one of 500 tons, besides numerous smaller orders. Prospects are unusually favorable in this department, and not only continued activity, but higher prices are somewhat confidently expected. The usual rates are about as follows: Ordinary Plate, 2.25¢ @ 2.30¢; Tank, 2.35¢ @ 2.40¢; Shell, 2.6¢ @ 2.7¢; Flange, 3.5¢; Fire-Box, 4¢; Steel Plates, Tank, 2.8¢; Shell, 3¢ @ 3.2¢; Flange, 3.3¢ @ 3.4¢; Fire-Box, 3½¢ @ 4¢.

Structural Iron.—The market is not specially active on new business, but deliveries on old contracts are keeping the mills very much crowded. The same report comes from all quarters, and the balance of the year will doubtless be one of great activity. There is a good deal of work in sight, and prices are inclined toward increasing firmness, although, in the meantime, quotations are about as follows: 2.4¢ @ 2.5¢ for Bridge Plate; 2.30¢ @ 2.35¢ for Angles; 2.8¢ @ 2.9¢ for Tees, and 3.3¢ for Beams and Channels.

Sheet Iron.—There is a fair demand for thin Sheets, while the heavier descriptions are in active demand. Prices are firm, and for the best make may be quoted as follows:

Best Refined, Nos. 26, 27 and 28.	3½¢
Best Refined, Nos. 18 to 25.	3½¢
Common, ¼¢ less than the above.	
Best Bloom Sheets, Nos. 26 to 28.	4½¢ @ 4½¢
Best Bloom Sheets, Nos. 23 to 25.	4½¢ @ 4½¢
Best Bloom Sheets, Nos. 18 to 21.	3½¢ @ 3½¢
Blue Annealed.	2½¢ @ 3¢
Best Bloom, Galvanized, discount.	60¢
Common discount.	65¢

Steel Rails.—There is a good deal of inquiry for Rails, but large buyers are standing off for materially lower prices. Manufacturers are willing to quote \$38 (in some cases a little less) on winter deliveries, but buyers' ideas are not over \$37, and firm offers even at that figure are not numerous. Summer deliveries are firm at \$39, and mills all full of work up to October.

Old Rails.—Business is almost at a stand, as buyers will not pay the prices asked unless they must have Rails, and very few are in that condition at present. Holders quote \$25 ex-store for T's and about \$24 for shipments, with buyers at \$23 or possibly \$23.50 for early shipments.

Scrap Iron.—There is not much activity, but prices are steady at last week's quotations—viz.: No. 1 Scrap, \$21 @ \$22; small lots, tide-water delivery, \$22 @ \$22.50; Selected do., \$23; No. 2 do., \$16 @ \$17; Turnings, \$15 @ \$16; Old Car Wheels, \$17.50 @ \$18.50; Old Steel Rails, \$20 @ \$21; Cast Scrap, \$16 @ \$17; do. Borings, \$12 @ \$13; Old Fish Plates, \$27 @ \$28.

Wrought-Iron Pipe.—Business at a standstill, and prices show no improvement, although bottom is thought to have been reached. One of the largest mills in this vicinity is closed on account of a strike, and the prospect for a reconciliation seems to be yet rather uncertain. Discounts during the past week about as follows: Lap Welded Black, 50¢; Lap-Welded Galvanized, 32½¢; Butt-Welded Black, 32½¢; Butt-Welded Galvanized, 22½¢; Boiler Tubes, 42½¢.

Nails.—There are but few Nails being sold and these mostly in small lots. Occasionally a 1000-keg order is heard of, but these are few and far between. \$2.15 @ \$2.25 is quoted from store, which, for the first time in three months, is being maintained. The Eastern Association held their meeting here on the 20th inst. and adjourned without doing anything definite. The general impression seemed to be that the National pool, of which there has been considerable talk, would be consummated, but they were doomed to disappointment. From the tone of those present at the meeting, however, such a pool would prove satisfactory and beneficial, and no doubt at the next meeting the committee appointed for the purpose will have prepared a suitable plan that will meet with the views of both Eastern and Western manufacturers.

Chicago.

Office of The Iron Age, 95 and 97 Washington St., CHICAGO, July 26, 1887.

A variety of influences is now at work in stiffening prices of all kinds of Iron and Steel. Crude material is dearer, hot weather interferes with manufacturing operations, manufacturers are less anxious to take orders than usual, and buyers are more disposed to anticipate their requirements. While a general advance in prices is deprecated, the indications are strongly in favor of it.

Pig Iron.—The demand is fully as active as it has been, with indications of its con-

tinuance for some time to come. Large contracts, and quite a number of them, have been placed during the past week, embracing Lake Superior and Southern Charcoal Irons, with a considerable quantity of Coke Iron of various kinds. The demand for Softeners for immediate delivery, such as American Scotch and Silver Gray, has been much beyond the supply. So great is the scarcity that parties have been glad to get even a part of a carload, in order to meet their pressing necessities. Southern Iron is now quite difficult to get, the charcoal furnaces in that section being practically sold up, and the Coke furnaces having withdrawn from this market almost entirely. Some consumers who were fortunate enough to have more Iron of some kinds than they needed have been disposing of it at current prices, with a view of using cheaper grades equally suitable for their purposes. The termination of the Coke strike is hailed with satisfaction by all parties. The situation was becoming very annoying. It is expected that the demand will be great enough to absorb the increased amount of Iron that will be put on the market by the resumption of the Coke furnaces, and that there will be no set-back to prices for, perhaps, the remainder of the year. The business transacted during the past week has been largely on account of the agricultural implement manufacturers and Malleable Iron works, with, of course, a fair sprinkling of orders from architectural foundries and the general trade. The Car Wheel manufacturers are looking about to cover contracts which have been recently taken. In a very few cases a slight premium has been paid for future delivery, but manufacturers' agents are generally willing to take orders based on prices current, which are as follows for cash, f.o.b. Chicago: Lake Superior Charcoal, Nos. 1, 2 and 3, \$23 @ \$23.50; Southern Cold Blast Charcoal, \$28; Hanging Rock and Jackson County Softeners, \$22 @ \$22.50; Straight Coke Foundry, No. 1, \$22.50 @ \$23; No. 2, \$21.50; No. 3, \$20.50; Coke Bessemer, run of furnace, \$22.50 @ \$23; Southern Coke, No. 1, \$22.50; No. 2, \$21.50; No. 3, \$20.75; Virginia Coke No. 1, \$22 @ \$23; No. 2, \$21.50.

Bar Iron.—The manufacturers of Cars are making inquiries and will need a considerable quantity of Iron to cover contracts recently made. Other buyers are in the market, some for season's supplies, and there is now every prospect of a very good demand for all kinds of Bar Iron. A great many mills are full of orders, and are asking an advanced price on recent quotations, some naming as high as 2¢ at mill for Common Iron. The ordinary quotation, however, is 1.90¢ at mill, or 2¢ @ 2.05¢ in carload lots, f.o.b. Chicago, making a clear advance of \$2 @ \$2.50 2/6 ton as compared with two or three weeks ago. Store prices are firm at 2.15¢ @ 2.20¢ for Common and 2 3/4¢ for Good Bars.

Structural Iron.—The demand for Iron for Bridge work has been less active during the past week than usual, but on the other hand orders for building work have been more numerous, so the average is sustained. Prices show no change.

Plates.—Bids are being made on large orders in competition with dealers from other points, but with no certainty that the work will be secured by Chicago merchants. Actual business during the past week has been quiet, and store trade running lighter than usual. No change in prices has yet been made by local dealers, but they say they will not be able to stand the pressure much longer, as the mills continue to ask higher rates.

Sheet Iron.—Manufacturers are still in receipt of inquiries, and in some cases are asking higher prices than those recently quoted, which in themselves marked an advance. Jobbers report an increased volume of business, but state that their trade has hardly begun yet, although they are in receipt of inquiries from parties who would like to buy for future delivery. Store quotations are still based on 3.50¢ for No. 27, while the mills ask 3.25¢ for No. 27, in carload lots, f.o.b. Chicago.

Galvanized Iron.—The demand is active, both as regards manufacturers' agents and jobbers. The resumption of building operations in Chicago has greatly improved the trade in light gauges. No changes are reported in prices, but greater firmness prevails.

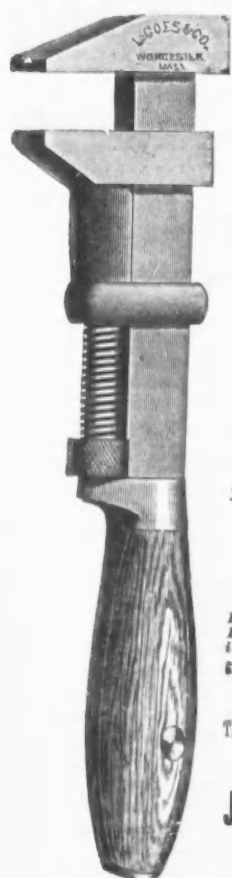
Merchant Steel.—Some agricultural implement makers are asking for bids on season contracts, and it is reported that some of them have already placed orders for part of their stock. Outside of this branch of trade business is not specially active. There is no quotable change in prices.

Steel Rails.—Manufacturers report a little inquiry for small lots for early delivery, but state that no business of consequence is developing for the future as yet. Prices are unchanged, being still quoted at \$42 for first quality standard sections.

Old Rails and Wheels.—Business is quiet in Old Rails, holders asking \$24 @ \$24.50. Car Wheels are now held at higher prices, \$22 being asked and \$21.50 bid. Buyers are not yet disposed to concede this advance, and no transactions have come to light.

Scrap Iron.—An increased demand is reported, which would be greater if all the rolling mills were running, quite a number of them having been closed for repairs for some time. Dealers note with much satis-

The purchasing prices offered by dealers are as follows :			
Heavy Copper	lb	D.	@ \$0.07
Light Copper	lb	D. @ .06
Copper Bottoms	lb	D. @ .06
Brass, Heavy	lb	D. @ .06
Brass, Light	lb	D. @ .04
Composition	lb	D. @ .04
Lead, Heavy	lb	D.	\$0.0394 @ .04
Lead, Light	lb	D. @ .0345
Zinc	lb	D. @ .034
Wrought Iron	ton	22.00	@ 10.00
Light Iron	ton	12.00	@ 10.00
Cast Iron	ton	12.00	@ 10.00
Machinery Iron	ton	15.00	@ 16.00
Grate Bars	ton	 7.00
Old Rubber	lb	D. @ 0.5
White No. 1	lb	D.	.0394 @ .034
White No. 2	lb	D.	.037 @ .034
Canvas, Linen, No. 1	lb	D.	.043 @ .034
Canvas, Cotton, No. 1	lb	D.	.044 @ .044
Canvas, No. 2	lb	D.	.029 @ .024
Seconds	lb	D.	.01 @ .018
Foot Woollens	lb	D.	.005 @ .014
Bagging	lb	D.	.01 @ .014
Junny Bagging, No. 1	lb	D.	.01 9-10 @ 11-10
Jute Butts	lb	D.	.01 9-10 @ .019
Book Stock	lb	D.	.007 @ .018
Newspapers	lb	D.	.004 @ .014
Base Line Bag	lb	D.	.004 @ .004
Kentucky Bagging	lb	D.	.034 @ .024
Kentucky Bale Rope	lb	D.	.034 @ .04
Kentucky Bagging	lb	D.	.024 @ .020



L. COES'
GENUINE IMPROVED
Knife Handle
PATENT
Screw Wrenches

MANUFACTURED BY
L. COES & CO.,
Worcester Mass.
ESTABLISHED IN 1830.



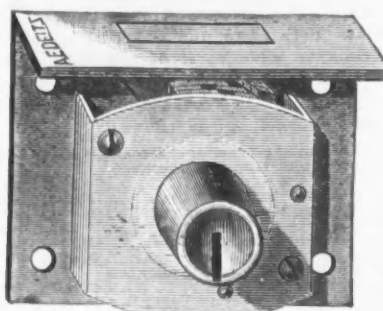
Sectional view illustrates our NEW
KNIFE HANDLE, showing Malleable
Iron Frame and Shank of Bar keyed
into position.
Straight Bar, Extra LONG NUT
FOR SCREW IN JAW

The Best Made and Strongest Wrench in the Market
Send for Illustrated Price List and Circular.

J. C. McCARTY & CO.,
NEW YORK,
Sole Agents.



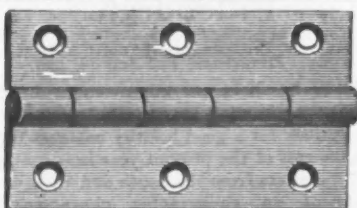
A. E. DEITZ.



No. 51 Lock.

J. C. McCARTY & CO., Agents,
97 Chambers and 81 Reade Sts.,
NEW YORK.

Factory, BROOKLYN, E. D., N. Y.



W. & J. TIEBOUT,
MANUFACTURERS OF
BRASS, GALVANIZED & SHIP CHANDLERY
HARDWARE.
Nos. 16 & 18 Chambers Street,
NEW YORK.



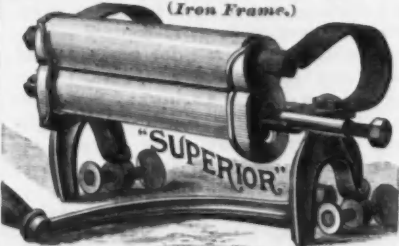
ALWAYS GIVES THE
UTMOST SATISFACTION.

Main Belting Co.,
Manufacturers of
THE LEVIATHAN
COTTON
BELTING.

Unsurpassed for
Strength, Durability and
Cheapness.
Made to any Length,
Width and Strength.
Main Driving Belts.
Guaranteed to Run
Straight, Even Through-
out.
No Cross Joints, Un-
affected by Damp,
Clings well to the Pulley,
Has no equal. In fact,
is THE BELT.

**MAIN BELTING
COMPANY,**
S. W. cor. Ninth and Reed
Sts., Philadelphia.
Also
248 East Randolph St.,
CHICAGO.

The "Superior Wringer."
(Iron Frame.)



Fully Warranted. Has Patent Adhesive Rolls,
Best Steel Springs, Malleable Iron Crank.
Send for fully illustrated Catalogue and Price
List of thirty different styles and sizes of Wringers.
BAILEY WRINGING MACHINE CO.
WOONSOCKET, R. I.



NON-CORROSIVE PRIMING

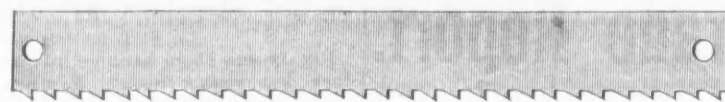
AND FINISHING PAINT

For Engines, Machinery, &c.
This paint being entirely free from acid will not
corrode or rust the iron.
PATENT IRON FILLING.
A composition for filling for Tools, Machinery, Engines,
Locomotives, Tenders, Iron Ships, and all iron work
for buildings, inside or out. Send for sample card,
price list and testimonials. FELTON, RAU & SIBLEY,
Nos. 136, 138 and 140 North 4th St., Philadelphia.

Patent Portable Rope Hoist.

The best quick lift made. Quickest,
lightest and cheapest.
Three sizes 500, 1000 and 2000 lbs. Just
the thing for quick lifting and lowering.
Send for descriptive circular and refer-
ence.

ENERGY MFG. CO.,
1115 to 1123 S. 15th Street,
PHILADELPHIA, PA.



ANY HARDWARE DEALER

in any place can have all the trade in

BUTCHER SAW BLADES

if he will take the trouble to show the Star Blades to the Butchers and per-
mit them to try their quality. There is not a single place where these Blades
have been used that they have not taken and held the market. They can be
sold for 10 Cents each, and that is less than the cost of filing a common
saw. They are so hard that one will cut three or four times as long as the
saws now in use without filing. As these Saws are not to be filed, and as
one only lasts a few months before getting dull, a great many of them are
wanted. They are listed on the 50th page of our new Catalogue which we
will send on demand.

MILLERS FALLS CO., 93 Reade St., New York.

STAR BUTCHER ★ SAW BLADES.

Length.	Width.	Gauge.	Teeth to Inch.	Per Dozen.
14 and 16 in.	1 in.	24	9 1/2	\$1.08
18 " 20 "	1 1/2 "	24	9 1/2	1.20
22 " 24 "	2 "	24	9 1/2	1.32



CHAMPLAIN
Forged Horse Nails.
MANUFACTURED BY THE
NATIONAL HORSE NAIL CO.,
Vergennes, Vermont.
HOT FORGED AND COLD HAMMERED POINTED. MADE OF BEST
NORWAY IRON AND WARRANTED.
WAREHOUSE
97 CHAMBERS AND 81 READE STREETS NEW YORK.
J. C. McCARTY & CO. Sole Agents.

INDURATED FIBRE WARE.
SEAMLESS

Pails,
Tubs,
Basins,
Keelers,
Milk Pans,



Spittoons,
Umbrella Stands
Water Coolers,
Slop Jars,
&c., &c.

Molded in one piece from wood pulp. Treated chemically, giving great
strength and durability, and at same time making the ware impervious to
liquids, hot or cold. Being neither painted nor varnished it will not impart
taste to anything put in it, and will not further absorb liquid or odor so as
to become heavier or foul. Is very light. Has no hoops to drop or rust off.
Warranted absolutely seamless and unaffected by extremes of weather.

EVERY ARTICLE WARRANTED.

FACTORIES:

PORTLAND, ME.
WATERTOWN, MASS.
MECHANICVILLE, N. Y.

OSWEGO, N. Y.
LOCKPORT, N. Y.
WINONA, MINN.

UNION INDURATED FIBRE CO.,

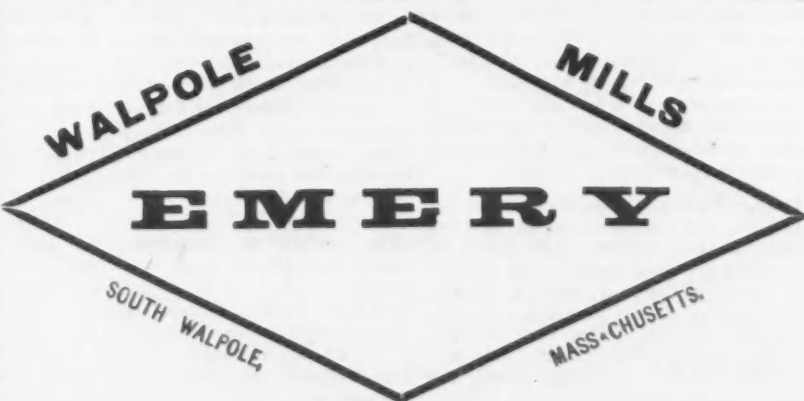
110 Chambers St., New York.

39 Wabash Ave., Chicago.

BRASS GOODS MFG. CO.,

Manufacturers of Stamped Brass, Silvered and Tin Goods, Hyatt's Patent Brass and Iron Spring Boils,
Bronze and Plated Thimbles, Roses, Plate Escutcheons, Socket Shells, &c., Mucilage Brushes, Patent
Mirror Pin Cushion Business Cards, Mirrors for Perfume Bottles, Hyatt's Patent Sensible
Safety Pins. Novelties of New Designs made to order.

Salesroom, 88 Chambers St., New York. Factory, 250 to 254 State St., B'klyn.



Hardware Dealers Take Notice,

and buy where you can get the best quality at the lowest price,
thereby not only satisfying your customers, but also putting
money in your own pocket.

Our Eureka Patent Flexible Back Saws, the teeth of which are
hard, the back being soft, thereby preventing them from breaking
in two, have been greatly improved and are giving the best sat-
isfaction. Our Crescent brand of Hack Saws are hardened all
through with uniform temper, and are the best Hack Saws so
tempered.

We are now preparing to supply the wants of the trade ac-
cording to their preference. Hardware Dealers run no risk by
buying from us either our Eureka or Crescent brand of Hack
Saws on our recommendation, as we give them the option of re-
turning the first lot to us at our own expense any time within
three months from date of invoice. Correspondence solicited.

Henry G. Thompson & Sons,

Cor. Elm and State St., New Haven, Conn.,

— MANUFACTURERS —

Flexible Back Band Saws for Cutting Metals,
Hack, Meat and Kitchen Saws and Frames.

SEND FOR CIRCULAR.

BRANCH OFFICE, 51 Leonard St., New York City.

American Tin Zinc Company,

Factory,
SEYMOUR, CONN.

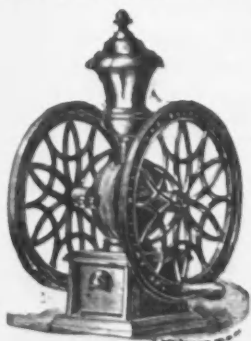
85 Beaver St., New York,

Telephone Call,
"PEARL 233."

TIN ZINC,

W. J. WILDER'S PATENT, March 10th, 1885.

A New Metal especially adapted for Roofing, Lining Refrigerators, the Manu-
facture of Britannia Ware and all Articles where Spun Metals are Required. An excel-
lent Substitute for Tin Copper and White Metals.



THE SWIFT MILL.
ESTABLISHED 1845.

The annexed cut shows one of the many styles of Coffee Mills of
our manufacture, especially adapted to Grocers' use and all retailers
of coffee. They are highly ornamental, and workmanship of the ver-
best. We make more than 30 styles.

ALSO, LANE'S PORTABLE COFFEE ROASTER.

Will roast 30 to 40 lbs. at once, and can be used as a stove at other
times. Send for descriptive list to Manufacturers,

LANE BROS., Poughkeepsie, N. Y.

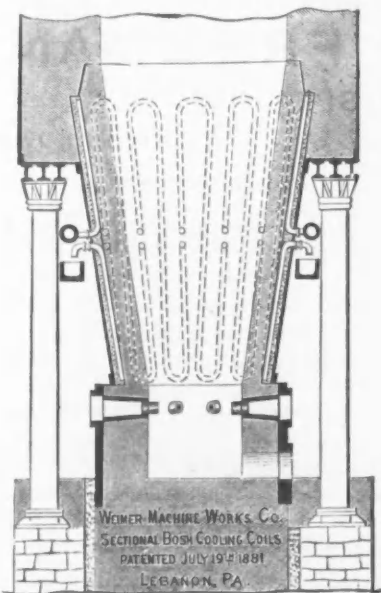
Also Sold by Leading Wholesale Houses.

Our agents, John H. Graham & Co., 113 Chambers St., New York
carry a full line of our goods, and will be pleased to serve you at
factory prices.

ALEXANDER BROS
BEST OAK BELTING
PHILADELPHIA.

Weimer Machine Works Company, LEBANON, PA.

DEVOTED EXCLUSIVELY TO
BLAST FURNACE EQUIPMENT.



Sole Manufacturers of the

CELEBRATED

Weimer Blowing Engines.

SOLID SPOUT
MINERS LAMP.



ESTABLISHED 1853

Howson & Sons

ATTORNEYS AT LAW

AND

SOLICITORS OF PATENTS

119 South Fourth Street

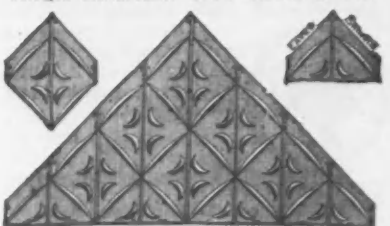
PHILADELPHIA, PA.

Branch: 915 F Street, WASHINGTON, D. C.

PATENTS

U. S. AND FOREIGN SECURED.
Trade Marks and Labels Registered. 15 years' experience. 4 years Examiner in U. S. Patent Office. Patent Causes litigated in the United States and Supreme and Circuit Courts. Expert Searches and Opinions as to Scope, Validity and Infringement of patents citing prior art and authorities on which conclusions are based. Opinions rendered are complete basis for a Bill in Equity, or an answer in defense thereof. PATENT PRACTICE EXCLUSIVELY.
Send Model or Sketch of your invention for FREE opinion whether patent can be secured, and new 60-page book, citing recent court decisions.
Specially posted in the arts of Paper, Wood and Metal Working, Stoves and Paper Metal and Wire articles, and court decisions concerning the same.
In justice to the publisher and for my information, please mention this paper. OFFICES 611 F STREET.
Address E. B. STOCKING, Attorney, Washington, D. C.

Anglo-American Iron Roofing Co.

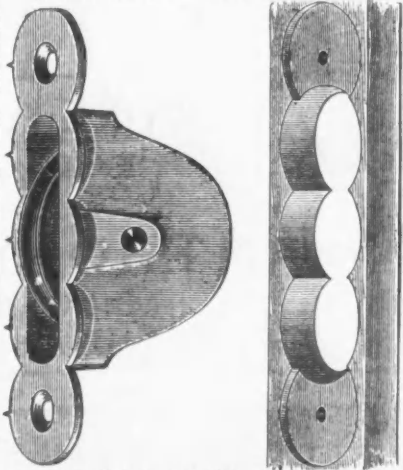


Iron and Tin Roofing for Fine Dwellings.
Handsome, Light and Durable.
GALVO-LEADED AND GALVANEIZED IRON.
Send for Circulars.

OFFICE NO. 9 PENN BUILDING, - PITTSBURGH, PA.

PALMER'S Common Sense Frame Pulley.

Saves the User 50 Cts. per Doz.



Morising all done with a bit. No chisels or other tools required. By hand-eight to one. By power-twelve to one. The only Frame Pulley the Trade can handle with profit. The only Pulley users will buy after seeing this. Send for Circulars.

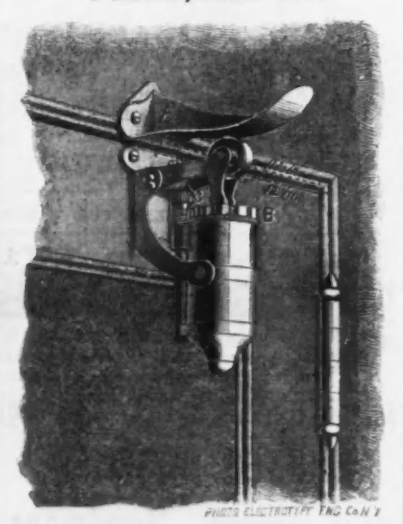
MANUFACTURED BY
PALMER MFG. CO., Troy, N. Y.
Sole Eastern Agts., PEABODY & PARKS, Troy, N. Y.

The Empire Sash Pulley. FOUND AT LAST



MANUFACTURED BY
EMPIRE PORTABLE FORGE CO.,
CONHOES, N. Y.,
Manufacturers of the largest and best line of
Portable Forges and Hand Blowers
FOR SALE EVERYWHERE.

The House Liquid Door Check, PRICE, \$1.00.



These Checks are made especially for Screen Doors, Doors between Dining Room and Kitchen, and Bath Room Doors.
Made of Steel and White Metal; are strong and durable. All working parts are submerged in oil, so there can be no wear.
It requires no skill to apply or to adjust them.

E. E. GRAVES, Manager,
BRIDGEPORT, CONN., U. S. A.

KNISELY & MILLER,
129 & 131 South Clinton St.
CHICAGO.,
MANUFACTURERS



ROOFING AND SIDING.

Send for Circular and Prices.



JOHN ADT & SON,
—BUILERS OF—
HARDWARE MANUFACTURING
MACHINERY.
Send for Catalogue.
NEW HAVEN, CONN., U. S. A.

MANUFACTURING.

Iron and Steel.

The removal of the rolling mill at Pomeroy, Ohio, to Bowling Green, Ohio, has commenced. The citizens of Bowling Green donate the land for the plant, agree to furnish free all the natural gas for fuel, and have offered other inducements that decided the owners to go there. The contract requires the parties to be making iron by January 1, 1888.

A meeting of the Association of Manufacturers of Sheet Iron and Sheet Steel of the United States was held at Cresson, Pa., on the 22d inst. The attendance was light, only a limited number of firms being present. No action of any importance was taken. There will be no further meetings of the association held till the hot weather is over.

The partnership heretofore existing between Thomas Barnes and William J. Barnes, as the Barnes Safe and Lock Company, at Pittsburgh, has been dissolved by mutual consent, W. J. Barnes retiring. The business will be continued by Thomas Barnes as the Barnes Safe and Lock Company.

The Lucy Furnace, at Pittsburgh, Carnegie, Phipps & Co., have ordered two feed-water heaters of 1000 horse-power each from the Wainwright Manufacturing Company, of Boston.

In one of the Pittsburgh papers recently there appeared a statement to the effect that the large pipe mill of James Freund & Co., situated in that city, would shortly commence operations. We are informed by the firm that they have no intentions of starting up their works at present.

W. H. Wallace, president of the Jefferson Iron Company, at Steubenville, Ohio, informs us that the report that they were about to commence the manufacture of coke is without foundation.

All departments of the Pennsylvania Steel Company's works, at Steelton, Pa., started up on the 18th inst. During the stoppage a number of extensive improvements were made to the plant.

Grace Furnace, of the Brier Hill Iron and Coal Company, of Youngstown, which has been idle since the commencement of the coke strike, resumed operations last week, a supply of coke having been obtained.

The new tube works being erected at Duquesne, near Pittsburgh, by McKeesport and Pittsburgh capitalists, is rapidly approaching completion. It is thought that the works will be in operation by October next.

A dispatch from Reading, Pa., dated July 21, says: A conference took place this afternoon between the managers of the Reading Iron Works and a committee representing its 1800 employees, who have been standing out against a 10 per cent. reduction for some weeks. The conference resulted in a victory for the men for the present, it being agreed that all hands are to go to work on Monday, finish all orders on hand and work up all material now on hand without the reduction taking place. The question of the proposed reduction will be considered when the new work comes in.

The Burgess Steel and Iron Works, of Portsmouth, Ohio, are enlarging their open-hearth steel plant by the addition of a new 10-ton furnace. Their old furnace is 8 tons' capacity.

Andrews Bros. & Co., proprietors of the Hazelton Iron Works, near Youngstown, Ohio, are making a number of extensive improvements to their plant. They are putting in a muck train engine, and making other changes which will increase the output considerably. The bar and guide mill departments of the plant will resume operations in a few days, and it is confidently expected that they will be fully employed for the balance of the year.

A dispatch from Pottsville, Pa., dated July 31, says: The strike at the Pottsville Iron and Steel Company's Fishback Rolling Mill is over, a conclusive settlement having been effected to-day. This afternoon the men were paid in full of all the balances claimed under the advance allowed in April, and the company conceded all demands made for the future. The mill will resume full handed to-morrow.

We take the following from the Sharon (Pa.) Herald of the 21st inst.: "The Sharon Iron Company's rolling mill is idle, taking stock and making repairs, and probably will not go into operation until the 1st of August. The mill of P. L. Kimberly & Co. is running in most of its departments double turn, except when heat compels a cessation, which it has done once in a while during the present heated term. The Stewart Iron Company's mill will shut down to-morrow, Saturday, for three weeks, in which necessary repairs will be made."

A dispatch from Warren, Ohio, dated July 20, says: Brown & Co., of Cleveland, have commenced suit against Oliver Summers, et. al., for the sum of \$30,000 with 7 per cent. interest since October 17, 1887; also for \$139.29 with interest from July 7, 1887. The amount invested is said to relate to the purchase of the old mill in Niles by Oliver Summers.

The Mullins Silicated Iron and Steel Company have been incorporated at East St. Louis Ill., with a capital of \$3,000,000, for the purification of iron and steel, by Abram D. Williams, Henry C. Span and John Lamb.

On the 16th inst. a heavy wind and rain storm blew down several brick stacks of the Delaware Rolling Mill, Phillipsburg, Pa., and about half of the building. The loss is estimated at \$10,000. Several other buildings in the vicinity were also destroyed and considerable damage done to trees and fences.

Machinery.

Articles of association for the Overhead Conductor Electric Railway Company, of Pittsburgh, were filed last week in the County Recorder's office. The company are for the purpose of purchasing, holding and selling of patent rights for electric railway

purposes, with the right to issue licenses for the same and receive pay therefor. The capital stock is \$300,000 in 6000 shares, divided as follows: George Westinghouse, Jr., 1200 shares; John Caldwell, 200; Herman H. Westinghouse, 200; F. L. Pope, 800; Thomas B. Kerr, 1200; Thomas B. Kerr, trustee, 2000; George H. Christy, 180; Caleb H. Jackson, 200, and R. H. Whittlesey, 20 shares.

The Skowhegan, Me., Water Company have contracted with the Worthington Company, of Boston, to put in water works, and work will be begun by August 1. A stand-pipe or tower is to be erected and a storage basin built, where an ample supply of spring water can be accumulated.

The American Tack Company, Fairhaven, Mass., have probably the largest and heaviest Blanchard tack machine in the world, making steel tacks 1 1/2 inches in length and with heads 1/8 inch in diameter. The tacks are made for H. W. Johns, of New York, and are used on felt roofing.

The Reading (Pa.) Times of July 23 says: "About \$40,000 of the stock of the Reading Steam Heating and Power Company have been subscribed for. The entire capital is \$100,000, but the officers will not wait until that is subscribed. As soon as they feel assured of success of their project they will go ahead."

The Wright & Adams Company, of Quincy, Ill., have completed one of their special high-speed engines for the United States Government, to be used for running a hydraulic dredge. This engine is somewhat novel in design, and is intended to exert about 150 horse-power. The company have also under construction for the United States Government a derrick engine, having four winding drums and winch heads, all working independently, each being driven by friction.

The Dean Bros. Steam Pump Works, of Indianapolis, Ind., are adding several new machines to their shop for constructing pumps. They are also making a number of large pumps for the South.

The Holly Mfg. Company's enlargements in the shape of a new erecting room and a new foundry at Lockport, N. Y., have been finished.

The McKinley Engine Company have removed to 912 Arch street, Philadelphia, Pa.

The Providence, R. I., Steam Engine Company, are making two shipments of the improved Greene engine to Germany.

The foundry and machine shop of Savage Brothers, 42 and 44 Michigan street, Chicago, were damaged by fire on the 18th inst., the foundry being nearly destroyed and the machine shop suffering considerably. The firm make a specialty of candy machinery, but employ their foundry in general jobbing. It is expected that they will repair damages and resume operations as soon as the loss is adjusted by the insurance companies.

Messrs. Hunt & Clapp, of the Pittsburgh Testing Laboratory, have established a branch office in the Portland Block, corner Dearborn & Washington streets, Chicago, with R. Ralston Jones as resident engineer. This enterprising firm is permanently locating inspectors of bridge-work and other structural material at a great many points. Both chemical and physical tests are made.

Messrs. Riehle Bros., proprietors of the Philadelphia Scale and Testing Machine Works, at Philadelphia, report the following recent orders: Furnace charging scales fitted with their patent notched poises for the Union Iron Company, of Detroit, Mich.; Isaac McHose & Sons of Norristown, Pa.; and the Colebrook furnaces of Lebanon, Pa.; a 40,000-pound hydraulic testing machine for the Christiansa Rolling Mill, of Wilmington, Del.; one of their latest improved "self-adjusting bearings" railroad-track scales for the Tidewater Steel Company, of Chester, Pa.; wagon scales for the Thompson Houston Electric Light Company, of Newark, N. J.; wagon scales for the Hudson Electric Light Company, of Hoboken, N. J.; one 1000-pound cement-testing machine, for United States Engineers' office, Buffalo, N. Y.; and a marble molding machine, for R. Gouldsburg & Sons, of New York. Besides the above they have received large orders from the United States Government for scales and trucks.

Messrs. London, Berry & Orton, of Philadelphia, Pa., have just issued a new catalogue illustrating and describing their large variety of wood-working machinery and saw-mill outfits. The arrangement of the matter throughout is of the most attractive character, the engravings are well executed, and the descriptions are rather more elaborate and carefully prepared than is usual in publications of this kind. There are 198 pages, and saw-mill men and users of wood-working machinery in general will find in them much that is of interest and value.

The Niles Tool Works, of Hamilton, O., have received orders from the Hill Clutch Works, of Cleveland, for some large special tools. Owing to the large demand for the Hill friction clutches, the makers, we are told, can hardly take care of their orders by running night and day, hence the necessity of increasing their capacity.

Among the recent shipments of the Salem Foundry and Machine Shop, of Salem, Mass., are two elevators to the Lonsdale Mills, Lonsdale, R. I., two to the China Mfg. Company, Suncook, N. H., and one each to the Coechee Print Works, Dover, N. H., and the Newbury Electric Light Company.

Hardware.

The New Castle Wire Nail Company, of New Castle, Pa., are about to make a number of extensive improvements to their works, which will add largely to their capacity.

The Alabama Bolt and Rivet Company have been incorporated at Chicago, with a capital of \$35,000, for the manufacture and sale of iron, by J. A. Burhaus, W. J. Thompson and J. B. Hall.

The Boston Twist Drill Company, of Boston, with a capital stock of \$60,000, have recently begun business as manufacturers.

Miscellaneous.

The Davy Crockett Mining and Smelting Company, of Hot Springs, Ark., have been incorporated with a capital stock of \$3,000,000. The Board of Directors consist of John L. Bowers, president; Jacques Brann, vice-president; Charles E. Eisle, secretary; E. S. Rockwood, treasurer, and F. G. Sargeant.

The Terre Haute (Ind.) Car Works, with the exception of the foundry department, were destroyed by fire July 13. The origin of the fire is unknown. Mr. Seath, the president of the company, estimates the loss at \$100,000; the insurance is between \$50,000 and \$60,000. Seven hundred and fifty men are thrown out of employment. The works will be rebuilt at once.

The New York Mining and Smelting Company, of Hot Springs, Ark., have been incorporated; capital stock, \$3,000,000.

The Scott & Walker Paper Company, Philadelphia, have removed their office and warerooms to 611 Commerce street, the building they vacated, 535 Arch street, being too small to meet the demands of a constantly increasing trade—in fact, they were compelled to rent storage in the neighborhood. The new building is a 4-storied brick structure, 90 feet in depth.

Some time ago Isaac Cline resigned the presidency of the Window Glass Workers' Association to engage in the glass business. A meeting of the association was held in Pittsburgh last week, at which James Campbell was elected to fill the vacancy.

Stewart, Estep & Co., whose glass works on the South Side were destroyed by fire a few weeks ago, have decided to erect new works at Blair's Station, in Milford township, Pa. A large gas well located at Cochran's Station will furnish fuel for the works.

A company, composed of R. E. Lawrence, G. H. Blackwelder, H. Schweiter, G. W. Bartholomew, C. R. Ross, O. Martinson, and C. B. Matterson, have been organized at Wichita, Kan., with a capital of \$150,000, to establish a wire and wire nail factory. A charter has been applied for, and plans for the main building have been decided upon. Mr. Matterson will be the general manager of the company.

On the 19th inst., at Litchfield, Ill., the employees of the Litchfield Car and Machine Company struck. They have been paid monthly heretofore, but now demand pay every two weeks, which the company refuse. The strikers had been led by some unknown parties to believe that a State law went into effect the 1st of July compelling all corporations to pay every two weeks.

A new mechanics' lien law went into effect in Illinois on the 1st inst., and its provisions are quite puzzling to many builders. Contractors have already experienced some difficulty in getting paid for work done because they must show under oath what is due to dealers in material or to sub-contractors or employees, all of whom are protected by the provisions of the law.

An electric street railroad is about to be constructed in Easton, Pa., the stock having been nearly all taken. The grade on the hill will be 8 1/2 feet to the 100.

The second annual report of Carroll D. Wright, Commissioner of Labor, relating entirely to convict labor, will soon be published. The total number of prisoners of all grades employed in the institutions comprehended in the report is 64,349, of whom 5895 are females. Of this total 45,257 are engaged in productive labor of some kind, 15,100 are engaged in prison duties and 3972 are sick or idle. Of the total number 14,827 are employed under the public account system, 15,670 under the contract system, 5676 under the piece-price system and 9104 under the lease system. The proportion of the total to the population of the United States as at present estimated is one in 930; but the proportion to those engaged in mechanical, agricultural and mining pursuits in the whole country is about one convict to every 300 persons so employed. The total value of goods made and work done by productive labor in the penal institutions of the whole country is \$28,753,999. It took 45,277 convicts one year to produce this total value. It would have taken 25,134 free laborers to have produced the same quantity of goods in the same time—or, in other words, a free laborer is equal to 1.27 convict; or, to reverse the statement, 1 convict is equal to 0.78 of a free laborer. The number of free laborers necessary to perform the same labor has been figured from the estimates of prison officials and others familiar with the work. In convict production boots and shoes lead, the product being \$10,100,279, or 35.13 per cent. of the whole product of the penal institutions of the country, the next largest item being the manufacture of clothing, which is \$2,199,634, while carriages and wagons are manufactured to the value of \$1,959,790. In all other industries the product is less than \$2,000,000.

At a meeting of the Freight Committee of the Central Traffic Association, held at Chicago, on the 20th inst., the following rates were authorized to take effect at once: On sand for glass manufacturers, Chicago to Hamilton, Ontario, \$2.50 per gross ton; steel rail ends, scrap iron and old rails, Chicago and Joliet to Pittsburgh, \$2.50 per gross ton, to Erie, \$2.50, to Youngstown and Valley points, \$2.25, to Cleveland, \$2 and Fort Wayne to Cleveland, \$1.60 per gross ton. It was also resolved that when special rates are authorized from Chicago to any point, East the rates from East St. Louis and other common points shall be made in the same proportion.

The reported strike at the Laclede Rolling Mills, St. Louis, was of short duration. We are informed by President T. A. Meyensburg, of the Tudor Iron Works, now operating the above-named mills, that work was suspended only on two days, Friday and Saturday, the 15th and 16th inst. It was entirely owing to a misunderstanding of the prices agreed upon in Pittsburgh, resulting from the lack of correct schedules, which were subsequently received. Work was resumed on the 18th, and the mills have been steadily running since.

Fast-Steamer Clyde-Built Vessels.

Under the above head *The Marine Engineer* of recent date remarks: Much of the ship-building and engineering work which has recently been turned out exhibits the high qualities for which Clyde workmanship has long been famous. In support of this we might instance several cases of huge steamships notable for strength of structure and power of engines—e. g., the magnificent P. & O. liner, the Victoria, of 6600 tons, built by Messrs. Caird & Co., and the belted cruiser for H. M. Government, the Australia, built by Messrs. Napier & Sons; but there is more call to point to the number of "fastest passages on record" which different types of vessels of recent Clyde build have been achieving. Notable among these are the performances of the Queen Victoria and the Prince of Wales, the new paddle steamers on the Liverpool and Isle of Man service. On the trial trip of the latter vessel the speed attained was 24 1/4 knots, or 28 miles per hour, and on a steaming distance of 32 knots between Ailsa Craig and Cambric Light, which was accomplished in 1 hour 25 minutes, the average speed was 22.6 knots, or 26 miles an hour. The Prince of Wales is, therefore, entitled to be considered the fastest steamer in the world (exclusive of some recent torpedo boats), and only slightly better than her sister ship, Queen Victoria, which covered the distance between Tail-of-the-bank, Greenock and Liverpool in 9 hours 23 minutes, steaming time, the mean speed being 22 1/4 knots per hour.

The race for supremacy in this important service has seemingly not yet been completed with the placing of these two craft on the route, as it is stated that the Isle of Man Steam Packet Company have asked the Barrow Shipbuilding Company if they can guarantee to produce a steamer to go at least 25 knots or the matter of 30 miles per hour. The reply to this, it is understood, has been made in the affirmative, and it will probably lead to an order. This, of course, means additional and still faster vessels of Clyde build in the future. The new steamer Meteor, built by Messrs. J. & G. Thompson for the London and Edinburgh Shipping Company, has accomplished the voyage between London and Leith—wharf to wharf—in 27 hours and 45 minutes, and from Gravesend in 25 hours and 40 minutes, this being the fastest passage on record between the two places, a distance of 475 nautical miles. Of this steamer it is interesting to note that, although exactly of the same form and dimensions as the Iona, the last crack vessel built for the company, she is about 5 per cent. lighter in structure, owing to improvements in systems of construction. She is fitted with the now universal triple-compound engines, and the substitution of these for the ordinary double-compound type results in the engines developing 50 per cent. more power with an addition in the weight of engines of only 16 per cent. over the old system. The Iona, it may be added, which left London one hour and 50 minutes before the Meteor on the passage above alluded to, only reached Leith five minutes sooner than the latter vessel. Another circumstance in which Clyde people justly take pride is the recent "breaking of the Atlantic record" by the Canader, Umbria. This vessel recently made the run from Queenstown to Fire Island, New York, in 6 days, 2 hours, 37 minutes, the shortest time on record. The best passage previously made was accomplished by her sister ship, the Etruria, in 6 days, 5 hours, 31 minutes, to Sandy Hook, the latter being 35 miles, or equivalent to 1 1/4 hours further steaming than Fire Island.

Ships' Bows and Safe Sailing.

Notwithstanding the great care, says the *Mechanical World*, which is usually exercised by the officers and crews of our large Atlantic liners to avoid disaster from collision on the ocean, we are now and again startled by the news of some casualty happening in mid-Atlantic, and usually resulting in great loss of life. The minute sub-division of the ship's hull into compartments, by means of numerous transverse water-tight bulkheads, and which are now being more thoroughly adopted on several new liners at present building, will no doubt do much to minimize the danger from collision, either with an iceberg, sunken rocks, or another ship. There is one point, however, with respect to the design of ships, which has evidently not received the attention which it deserves, and that is the shape of the ship's bows, and this is a most important matter when we come to consider it. All merchant vessels as now built have the straight up and down rowing boat stem, which does not add to the appearance of the ship, but it makes an excellent ram, wherewith to cut down another ship to the water's edge. The chief reason for the adoption of this style of bow is economy; it will cost less in building than the old-fashioned, but handsome figurehead bow, now entirely abandoned. The old type of ship's bow, though ornamental, was yet useful. If we consider that a ship's sides are built inclining inward from about the load line to the upper deck, it follows that the part most exposed to damage is at the water level, from the greater width there.

With our straight stem steamers, when a collision occurs, especially when a ship is struck amidship, it is cut open down to below the water line and is in immediate danger of foundering. A straight stem has a few minor advantages, such as a little less weight forward, the total length is slightly reduced, requiring less dock space. But the principal advantage which weighs with shipowners is that of economy, but it is at best but false economy to knowingly provide a ship with a destructive feature. When expense is incurred in building the ship with transverse and even longitudinal bulkheads, a little additional money expended in shaping the bow so that it may not act like a ram in the most destructive manner is a point perhaps worth the consideration not only of the shipowners, but also of shipbuilders. We have been led to make these observations from reading some remarks made on this same subject by Mr. Haldane, in his book on "Engineering Socially Considered." Mr. Haldane says: "The handsome old

figurehead stem had no such advantages—that is, less weight, diminished cost, reduction of length—but nevertheless possessed one special feature of great value, which was, that the vessel that it ran into was struck in her upper works, in some cases far above the water level, and the whole force of the blow was received at a place where fatal injury might thus have been prevented. The overhanging part of the stem of the colliding ship also sustained the greater portion of the damage, and thus protected her own bow below water from very serious casualty."

Thermal Conductivity of Iron, Copper and German Silver.

One of the papers communicated to the last meeting of the Royal Society of Edinburgh, Scotland, had as its subject "The Thermal Conductivity of Iron, Copper and German Silver," the author of which was Mr. A. C. Mitchell. The paper stated that the experiments described by the author were a repetition of those embraced in an exhaustive inquiry that was made by Prof. P. G. Tait, in the same subject about 10 years ago, and the results of which were communicated to the society in the year 1878. They were expressly based on the experiments that had previously been made by the late Principal Forbes, and which were instituted for the purpose of giving a real indication of the conductivity for heat in the case of any one substance. According to these experiments, the decrease in the conductivity for heat in iron is very much smaller than given by Forbes for the same metal, and is really so small that the thermal conductivity of iron is practically the same at all temperatures. As for copper and German silver, they were found to increase in thermal conductivity with increased temperatures. Both in Principal Forbes's and Professor Tait's experiments a source of uncertainty was introduced by the excessive radiation from the oxidized surface of the experimental bars. So as to obviate this, Professor Tait suggested that the bars should be plated with nickel, and as he was himself at the time fully engaged with work for the Challenger Expedition, Mr. Mitchell adopted his suggestion, and carried out the experiments. That had now been done, and the results, while slightly differing from those formerly obtained, fully bore out the former calculation, and were probably as exact as could be obtained from the method employed. Principal Forbes had been led by analogy to believe that thermal conductivity should be diminished by increased temperature, as is known to be the case in electrical conductivity. Mr. Mitchell's results bore out those of Professor Tait, which showed that if there were in any case a diminution it was an exceedingly small and exceptional one.

The American Institute of Mining Engineers held the first session of the nineteenth annual meeting in Duluth, Minn., on Tuesday. About forty members, gathered from all parts of the country, were present, and many more are expected.

Coal Market.

There is little to note of importance in Anthracite Coal trade, the business in progress being satisfactory in volume and at least moderately remunerative to the producers, with every assurance of an active fall business later on. For some time past there has been no disposition on the part of sellers to accept orders for future delivery. The Lehigh Valley Railroad Company have given notice that on August 1 a new tariff of tolls slightly advanced would take effect on their road and its connections through New Jersey and elsewhere. The Coal companies report officially that the total amount of coal sent to market last week was 750,307 tons, being an increase of 100,000 tons compared with the corresponding week last year, and the total production thus far since January 1 is 17,963,000 tons, or an increase of 1,835,000 tons compared with the same time in 1886. Coal deliveries at all the lake ports are reported active.

A meeting of Coal Trade managers will take place to-morrow (Thursday) to agree upon prices for August. It is surmised that an advance of 15¢ per ton will be made on Broken and 10¢ on other sizes, excepting the smallest.

The Reading Railroad last week transported 150,000 tons of Coal, and the wharves at Port Richmond will be worked day and night as soon as the company are pressed with orders. The Pennsylvania Railroad Coal tonnage since January 1 amounts to 5,575,000 tons; increase compared with 1886, 1,158,000 tons.

Bituminous Coal shipments are increasing; from the Cumberland region for the year thus far the amount is 1,655,161 tons.

Imports.

The imports of Iron and Steel, Hardware, &c., at this port from July 18 to July 23 inclusive, were as follows:

Iron and Steel.	Tons.
Fig Iron: Naylor & Co.	1,300
Crocker Bros.	100
W. H. Walbaum & Co.	530
Thos. J. Pope & Bro.	300
W. R. Ellis	150
James Lee & Co.	200
E. S. Wheeler & Co.	300
James Williamson & Co.	300
G. W. Stetson & Co.	300
H. Irwin & Co.	300
Spiegelstein: Naylor & Co.	200
J. Abbott & Co.	1,440
Crocker Bros.	410
Jana & Co.	200
J. A. Jansen	2,005
Old Iron Rails: W. H. Crossman & Bro.	300
Thos. J. Pope & Bro.	300
Wire Rods: Naylor & Co.	400
E. S. Wheeler & Co.	687
Carr & Moen	66
R. H. Wolff & Co.	100
Lalanc & Grosjean Mfg. Co.	18
J. Abbott & Co.	100

Steel: Chas. Hugill	9
Union Bridge Co.	40
W. F. Wagner	30
Thos. Prosser & Co.	15
Montgomery & Co.	10
Pears & Co.	15
J. Abbott & Co.	2
Newton & Shipman	5
F. S. Jackson	5
Temple & L.	2
C. F. Baker	7
C. W. Power	4
M. John & Co.	6
Steel Billets: Cleveland Rolling Mills	905
Dana & Co.	55
Naylor & Co.	664
Steel Sheets: R. F. Downing & Co.	7
A. Milne & Co.	1,132
Steel Bars: E. T. Nichols	13
Steel Slabs: R. F. Downing & Co.	96
Steel Plates: Naylor & Co.	348
R. F. Downing & Co.	170
Union Bridge Company	101
Bessemer Scrap Steel: A. Milne & Co.	273
Rivet Rods: G. Lundberg	50
Bacon & Co.	101
Milne & Co.	281
Crop Rods: Dana & Co.	55
Naylor & Co.	895
Steel Tyres: Thos. Prosser & Son	20
Iron Ore: R. de Floras	74
F. W. T. Marston	6
W. V. Jackson	185
Iron: G. Trindberg	27
E. V. Jacobus	48
N. Klenberg	
Steel Iron: F. B. Coddington & Co.	
Charcoal Iron: A. Milne & Co.	

Tin Plates.	Boxes.
Naylor & Co.	9,129
Phelps, Dodge & Co.	14,532
Pratt Mfg. Company	2,983
Dickerson, Van Dusen & Co.	8,390
R. Crooks & Co.	2,566
Lalanc & Grosjean Mfg. Company	227
N. L. Cort & Co.	4,951
F. B. Coddington & Co.	2,840
H. R. De Milt & Co.	574
Central Stamping Company	1,494
A. A. Thomsen & Co.	6,161
Bruch & Co.	1,115
J. M. Warren & Co.	211
S. Shepherd & Co.	1,321
J. Byrne & Son	280
W. S. Wheeler & Co.	2,533
E. S. Wheeler & Co.	534
H. Whittemore & Co.	333
C. N. Mersick & Co.	230
G. B. Morewood & Co.	500

Metals.	Pounds.
Tin: Naylor & Co.	380,485
N. Corwith & Co.	56,000
Hendricks Bros.	11,405
Phelps, Dodge & Co.	338,983
Bruce & Cook	13,916
Muller, Schall & Co.	131,068
American Metal Co.	26,880
D. Thomson & Co.	24,679
Nickel: McCoy & Sanders	10,152
Sheet Zinc: Naylor & Co.	224,028
Spelter: Naylor & Co.	442,413
T. J. Pope & Bro.	56,000
Antimony: Thos. J. Pope & Bro.	84

Warehoused from July 18 to July 23 inclusive:

Old Iron Rails: Naylor & Co.	Tons.
Iron Rods: N. Tilenberg	527
Iron: N. Tilenberg	265

Hardware, Machinery, &c.

Boker, Hermann & Co., Mdse., cs., 38; Arms cs., 7	
Erie Dispatch Co., Machinery, pkgs., 9	
Field, Alfred & Co., Mdse., cs., 36	
Folsom, H. & D., Arms, cs., 6	
Graef Cutlery Co., Mdse., cs., 11	
Honors & Ewite, Mdse., cs., 1	
Hartley & Graham, Mdse., cs., 16	
Johnson, J. & Co., Mdse., pkgs., 60	
Junge, F. W. & Co., Mdse., cs., 10	
Kastor, A. & Co., Mdse., cs., 7	
McCoy & Sanders, Mdse., cs., 6	
Pioneer Iron Works, Mdse., cs., 3	
Schutte, W. & Co., Mdse., cs., 3	
Wiebusch & Hilger, Mdse., cs., 29; Chains, cks., 28	
Witte, John G. & Bro., Cutlery, cs., 2; Nails, kgs., 16; Mdse., pcs., 8; Hardware, pcs., 53	

A corporation for the manufacture of fire-arms, ammunition, &c., to be known as the Remington Arms Company, have been organized in Ilion, N. Y., with a capital stock of \$400,000, divided into 16,000 shares of \$25 each; 8000 shares are preferred stock and the remainder common stock.

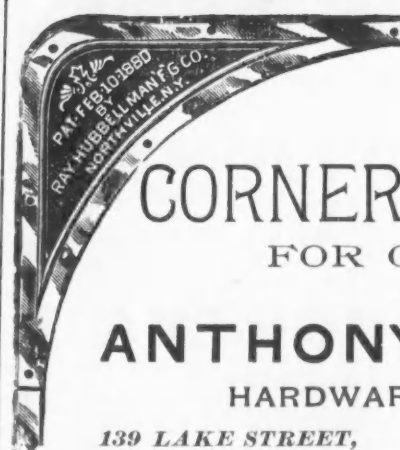
CONTENTS.

	PAGE
The Automatic Boiler. Illustrated	1
The Comparative Value of Steam and Hot Water for Transmitting Heat and Power	1
Astronomical Photography	9
A Novel Suspension Foot Bridge	9
Latest Legal Decisions	11
English Letter	13
Editorial:	
The Modern "Trust"	14
The Right to Stop Strikes	14
Progress of a New British Colony	14
Mineral Products of the United States in 1886	14
The Resistance Torpedo Experiments	15
Raising a Sunken Ship	15
A Canal Connecting Two Seas	15
The Iron Age Directory	15
Foot-Power Folder. Illustrated	17
Tyler's Patent Flour Receptacle. Illustrated	17
Excelsior Expansion Bit. Illustrated	17
The House Liquid Door Check. Illustrated	17
The Coke Strike Ended	17
Foreign Markets	17
Exports	17
Current Hardware Prices	20
Trade Report:	
British Iron and Metal Markets	22
Financial	22
General Hardware	22
New Markets	26
Metal Markets	26
New York Metal Exchange	26
Philadelphia	26
Chicago	26
Cincinnati	27
St. Louis	27
Cleveland	27
Pittsburgh	27
Birmingham	27
Cincinnati	27
Louisville	27
Detroit	27
Old Metals, Rags, &c.	27
Blast Pipes	28
Mechanical:	
Improved Molder. Illustrated	24
A New Form of Drilling Machine	24
The Laxey Water Wheel. Isle of Man	24
England	24
Warping of Grate Bars	24
Castor Oil as a Lubricant	24
The Eiland Gas Engine	24
Priming in Boilers	24
A New Expansion Reamer. Illustrated	24
Locomotive Boilers at Sea	21
The Week	25
Manufacturing:	
Iron and Steel	29
Machinery	29
Hardware	29
Miscellaneous	29
Fast-Steamer Clyde-Built Vessels	20
Ships' Bows and Safe Sailing	20
Thermal Conductivity of Iron, Copper and German Silver	20
Coal Market	20
Imports	30

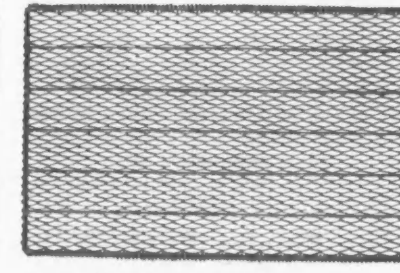
The McLAGON FOUNDRY CO.,

Iron Founders and Pattern Makers,

26-30 Audubon St., NEW HAVEN, CONN.



Ray Hubbell's
PATENT
CORNERS AND BINDINGS
FOR OIL CLOTH,
FOR SALE BY
ANTHONY FREEMAN,
HARDWARE SPECIALTIES,
139 LAKE STREET, CHICAGO, ILL.



Steel Wire Door Mat.

—ADAPTED FOR—

Hotels, Restaurants, Cafes, Offices, Banks,
Stores, Depots, Public Buildings,
Residences, Street Cars, Steam Ships,
Rail Road Cars,
And all places where a Mat or Matting is Used.

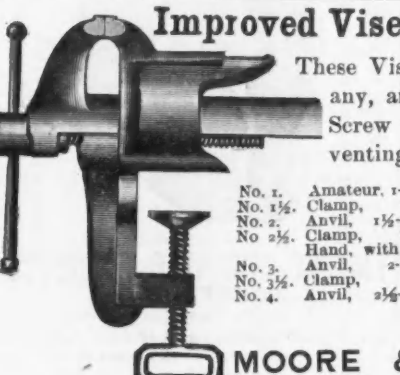
Woven as to form a series of scrapers for removing mud, snow, ice and water quickly and effectually from the feet.

It is flexible, and will adapt itself to uneven floors. It does not fill up, break down, or become soggy; is made from hard steel wire and thoroughly galvanized to protect it from the weather.

No. 2, 16 x 24 each, \$2.50 No. 5, 24 x 48 each, \$5.75
No. 3, 18 x 30 " 3.00 No. 6, 30 x 48 " 6.50
No. 4, 22 x 36 " 4.00 No. 7, 36 x 48 " 8.00

Discount, —Per Cent.

G. IRVING ABENDROTH, AGENT,
28 Cliff Street, New York.



Improved Vises with Anvil and Clamp.

These Vises are the best made and finished of any, and very convenient. Steel Lever and Screw which is covered by Sliding Bar preventing injury from filing, &c.

No. 1. Amateur, 1-inch Jaws, opens 1 1/4 inches.	25c. each
No. 1 1/2. Clamp, " " " " " "	35c. "
No. 2. Anvil, 1 1/2-inch " " " " " "	35c. "
No. 2 1/2. Clamp, " " " " " "	45c. "
No. 3. Hand, with Bench Attachment, 2-inch Jaws, opens 2 1/2 inches.	\$1.00 "
No. 3 1/2. Anvil, " " " " " "	1.25 "
No. 4. Anvil, 2 1/2-inch " " " " " "	1.50 "

—MANUFACTURED BY—

MOORE & BARNES MFG. CO.,
103 CHAMBERS ST., NEW YORK.

DIEBEL MANUFACTURING CO.

PHILADELPHIA, PA., U. S. A.

MANUFACTURERS OF

"The Challenge" Emery Grinders and Polishing Machines,

PULLEYS, COLUMNS and COUNTERSHAFTS.

SEND FOR CATALOGUE JUST ISSUED.

Samson Window Cord.

Solid Braided Lines for Window Cord, Railroad Bell Cord, Masons' Lines, Garden Lines, Clothes Lines, &c. Send for Samples.

J. P. TOLMAN & CO., 164 High St., Boston, Mass.

MARTEN DOSCHER.

Commission Hardware.

88 Chambers St., New York.

Agent—G. W. Bradley's Edge

Tools, Axes, Coopers' Tools,

Cleavers, Bush Hooks, Draw

Knives, Ship-Carpenters' Tools,

&c. Also a full stock of Planes,

Brooks' Bright Wire Goods,

Washita Stone and Taunton

Tack Co.'s Rivets, &c.

INTERCHANGEABLE LOCK-CORNER SHELF BOXES.

Screw Cases, &c., FOR THE HARDWARE TRADE.

S. H. GREEN, 55 Park Place, New York.

PATENT DRAW KNIFE CHAMFERER.

Can set the adjusting screw to the width of chamfer wanted. For sale by the jobbing and retail hardware dealers.

J. H. Hoague & Co., Chicopee, Mass.

TOOL MANUFACTURERS.

STEEL STAMPS.

Superior Cold-rolled figures at 90 cents a set; letters, \$2.70. Iron type, name stamps, initial stamps, house numbers, stencils, brass signs, brass letters, printing dies, &c. Send for free illustrated Catalogue.

BELLOWS & DICKEY, 39 to 43 Viaduct, Cleveland, Ohio.

The T. H. Bullock,

BELLOWS The Best for the Money.

FORGES

CLYDELAND, OHIO.

Samuel Martin,

MANUFACTURER OF

Theatrical Hardware,

127 Eighth Avenue, New York.



FRANCIS AXE CO., Buffalo, N. Y.

Manufacturers of STANDARD and ALL-STEEL AXES.
Will make Special Prices on

AXES

Ordered before August 1st.

Send for New Illustrated Catalogue. Order sample box of our New

"BUFFALO" BEVELED AXE,
AMERICAN OIL STOVE CO.

MANUFACTURERS OF

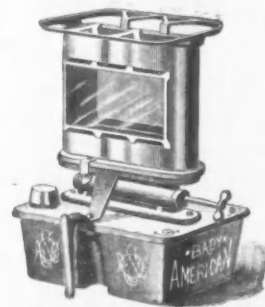
Cooking and Heating Oil Stoves in every Variety,

from the Lamp for Lighting, Cooking and Heating, up to and including the Cooking Range of capacity sufficient for a large family and Heaters for large rooms, all having the Patent Wick Raiser and Burner, and Improved Filler, Illuminated Ovens, &c., &c. See list in *Iron Age* issue 23d inst., and send for the best Illustrated Catalogue yet published.

The Alford & Berkele Co.

Manufacturers' Agents,

P. O. Box 2002. 77 Chambers St., New York City.



25% more powerful than any other Lamp Stove.

MERRILL & WILDER'S EXTRA SOCKET FIRMER CHISELS
SOLID CAST STEEL.

These Tools are tempered by an improved process, insuring a Perfect Cutting Edge.



THIS CUT ILLUSTRATES A NO. 10 SET IN FANCY BOX.

CONDITIONS OF WARRANTY:

We warrant all goods bearing our trade-mark to be perfect when they leave the shop, so far as the material and workmanship are concerned. If a tool proves too soft and bends on the edge or breaks in consequence of a flaw in the steel and is returned to the person from whom it is bought within thirty days from date of purchase, a new tool will be given in exchange. If it is broken where the steel is sound, it will not be exchanged.

Price, No. 10 Set: 12 Chisels from 1 1/2 to 2 inches sharpened and set ready for use, in Fancy Wooden Box. \$6.00

These Chisels can be obtained through any Wholesale Hardware House in the United States.

C. E. JENNINGS & CO., 79 Reade and 97 Chambers St.
NEW YORK CITY.

THE BOSTON KNOB CO.,
189 High Street, Boston.

Reduction in Price.

COLORS

CONSIDERED MOST DESIRABLE.

3. Garnet (Dark Cherry or Mahogany).
7. Olive (Dark).
8. Olive (Light).
10. Drab.
13. Brown (Light).
14. Brown (Light Cherry).

All Colors Warranted Not to Fade.

List Price \$10 per Doz

Send for Illustrated Catalogue.

SHERMAN & FEARING, 100 Chambers St., New York, General Agents.

W. BINGHAM & CO.,

MANUFACTURERS AND DEALERS IN

HARDWARE,

RAILWAY, MINERS', ENGINEERS', ARCHITECTS', MECHANICS', MACHINISTS' and FACTORY TOOLS and SUPPLIES.

146, 148 and 150 Water St., CLEVELAND, OHIO.

TRADE MARK
KALYE

For Preparing Metal Surfaces for Plating.

In use by leading Nickel-Platers, Manufacturers of Optical Goods, Watch Springs, Wire and other Metal Workers. Also, by Jewelers. Send for Circular.

NEW YORK CHEMICAL WORKS, 100 and 102 Reade St., New York.

ELIZABETHPORT STEAM CORDAGE CO.,

MANUFACTURERS OF MANILA, SISAL AND TARRED

CORDAGE OF ALL KINDS.

BINDER TWINE A SPECIALTY.

E. M. FULTON.

D. B. WHITLOCK.

A. W. LUKENS.

46 South Street, NEW YORK.

WM. McILVAIN & SONS,

MANUFACTURERS OF

BOILER PLATE

AND

CHARCOAL BLOOMS.

Locomotive, Fire Box, Flange and Shell Iron; Plate for Bridges and Girders; Tank and Stack Iron; Boat Plate and Iron for Wrought Pipe; Plate Iron for Fire and Burglar Proof Safes.



Plates 1 1/4 inch thick to No. 14. CAPACITY. 30 feet long. 70 inches wide.

AMERICAN BOLT COMPANY,

Manufacturers of

BOLTS AND NUTS, COACH OR LAG SCREWS

Bridge Bolts, Car Bolts, Track Bolts, Washers, Chain Links, BUILDING BOLTS AND IRONS OF ALL KINDS, Forgings, Bolt and Nut Machinery, &c.

JAMES MINTER, President.

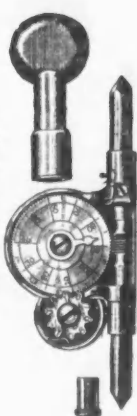
LOWELL, MASS.

MILES F. BRENNAN, Treasurer.

GEO. W. CHURCH.

GEO. W. MONTGOMERY.

CHURCH'S PATENT IMPROVED DOUBLE SPEED INDICATOR. Either Right or Left.



MONTGOMERY & CO.,
Importers of Stubs' Files, Tools & Steel, GRIST SWISS FILES, CHESTNUT TAPERED FILES, &c. ROBERT'S PATENT EMERY PAPER. WM. SMITH & SONS' CELEBRATED MUSIC WIRE. 105 Fulton Street, N. Y.

NORRISTOWN IRON WORKS,

Manufacturers of

Wrought Iron, Steam, Gas and Water Pipe

from 1/4 to 2 1/2 in. inclusive.

JAMES HOOVEN & SON,
Norristown, Pa.

Established 1846.

THE GALLOWAY BOILER.



Safety, Maximum Economy in Fuel, Lowest Cost of Maintenance, Greatest Durability, Large Steam and Water Spaces, are the Advantages offered by this Boiler.

SPECIFICATIONS AND PRICES UPON APPLICATION TO

EDGE MOOR IRON COMPANY,
POST OFFICE, WILMINGTON, DEL.

WILLIAM SELLERS, Pres't.

JOHN SELLERS, JR., Vice Pres't.

GEO. H. SELLERS, General Sup't.

WM. F. SELLERS, Secretary.

WILLIAM H. CONNELL, Treasurer.



PATENTED MAY 19, 1885.

A great improvement over the old style. Prevents slipping from head of the nail. Made of best quality Tool Steel. Carefully tempered. Appreciated and bought at sight by all mechanics. Prices on application. Made only by
The Edward Storm Spring Co., Limited, Poughkeepsie, N. Y.
JOHN A. GRAHAM & CO., 113 Chambers St., New York, General Agents.

MANUFACTURERS OF AND DEALERS IN ALL KINDS OF

THE LARGEST FACING MILL IN THE WORLD.

FOUNDRY FACINGS

Plumbago, Graphite or Black Lead.

Finest Return and Stove Plate Facings. Used by all Stove Manufacturers who pride themselves upon the Handsome Castings they make.



Capacity 1000 Barrels per Day.

FOUNDRY SUPPLIES

SHIPPERS OF THE

Celebrated Cincinnati Molding Sand.

Monk's Molders' Tools

Will guarantee our "National" and "Eagle" Return Facings to be superior to any similar Facings manufactured.

No charge for Trial Samples. Send for Illustrated Catalogue and Price List.

S. OBERMAYER FOUNDRY SUPPLY MFG. CO.
CINCINNATI, OHIO.

ALSO MANUFACTURERS OF THE CELEBRATED
EAGLE PURIFIED FIRE-PROOF STOVE VARNISH.
For Quick Polish in Dry or Damp Weather, for Varnishing Polished Edges of Stoves and for the Preservation of Stoves and all Bright Metals from Rust, it is Superior to all other.

THE BABCOCK & WILCOX CO.

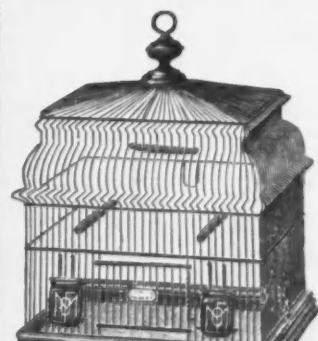
VALUABLE BOOK ON STEAM

FREE ON APPLICATION

WATER TUBE STEAM BOILERS.

BRANCH OFFICES:
BOSTON, MASS. 65 OLIVER ST.
PHILADELPHIA, PA. 32 N. 5TH ST.
CHICAGO, ILL. 64 S. CANAL ST.
NEW ORLEANS, LA. 57 CARondelet ST.
SAN FRANCISCO, CAL. 561 MISSION ST.
LONDON, ENG. 114 NEWGATE ST.
MANCHESTER, ENG. 3 VICTORIA BUILDING
PARIS, FRANCE. 40 RUE DE MALTE
HAVANA, CUBA. W. I. 50 SAN IGNACIO.
SYDNEY, N.S.W. 3 SPRING ST.

J.F. WOLLENSAK'S PATENT TRANSOM LIFTER AND LOCK
FOR ALL KINDS OF TRANSOMS, SKYLIGHTS, FANLIGHTS.
SEND FOR CATALOGUE AND PRICE LIST.
J.F. WOLLENSAK,
PATENTED AND SOLD EVERYWHERE.
CHICAGO, ILL.



OSBORN MFG. CO.
TRADE MARK
BLEECKER ST. NEW YORK.

The Original Inventors and Manufacturers of the

"OSBORN"

Bright Metal Cages, in Brass, Bronze and Silver Plate.

NEW AND BEAUTIFUL DESIGNS JUST OUT.

We also Manufacture Brass and Bronze Show Stands for Fancy Goods. Catalogues Mailed Free.

SALEM LEAD CO.,

MANUFACTURERS OF

PURE WHITE LEAD, Lead Pipe and Sheet Lead.
SALEM, MASSACHUSETTS.

FOR FINE CUTS SEND TO **KYES & WOODBURY,**
ENGRAVERS WORCESTER, MASS.

KEITH & TRUFANT
MANUFACTURERS OF
WIRE NAILS
WHITMAN & WIRE TACKS
MASS. OF EVERY DESCRIPTION.

A NOVELTY IN SHOVELS.

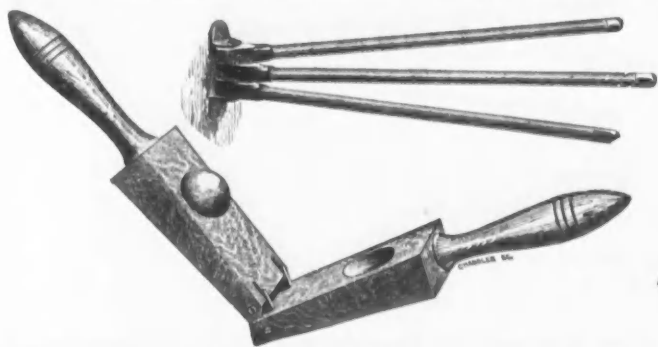
MAYNARD'S

PATENT SOLID CAST STEEL SOCKET SHOVELS AND SPADES.

Forged from a single piece of Cast Steel, without welding. The best, strongest and handiest ever made. For sale by

GEO. W. BRUCE,

24 Duane St., New York.



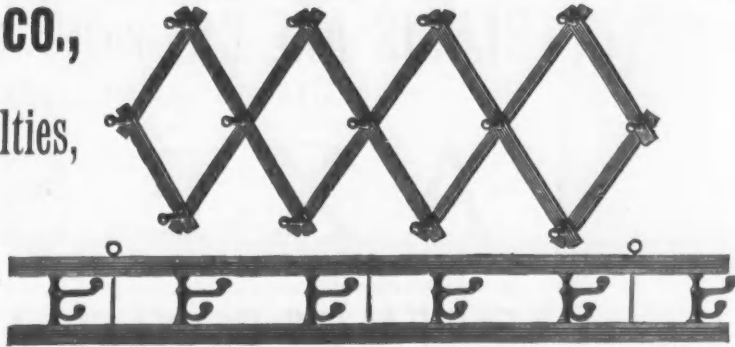
TUCKER & DORSEY MFG. CO.,

MANUFACTURERS OF
Woodenware and Hardware Specialties,
INDIANAPOLIS, IND., U. S. A.

Write for
Special Dis-
counts



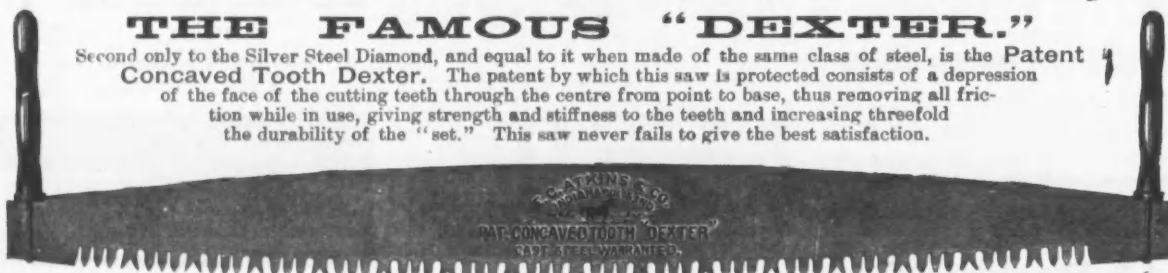
To Jobbers,
and notice
next issue.



E. C. Atkins & Co., Indianapolis, Indiana.

THE FAMOUS "DEXTER."

Second only to the Silver Steel Diamond, and equal to it when made of the same class of steel, is the Patent Concave Tooth Dexter. The patent by which this saw is protected consists of a depression of the face of the cutting teeth through the centre from point to base, thus removing all friction while in use, giving strength and stiffness to the teeth and increasing threefold the durability of the "set." This saw never fails to give the best satisfaction.



Ground substantially uniform gauge on the toothed edge, and any gauge required on the back.

ATKINS'

Cross-Cut, Circular, Band and Gang

SAWS

Are Everywhere Recognized as the
Standard of Excellence.

WESTERN AGENCY FOR

Tanite Emery Wheels.

Gray Iron and Brass Castings

OF SUPERIOR QUALITY AND FINISH.

SMALL IRON CASTINGS,

Warranted Soft, Sound, Smooth, Strong and True to Pattern.
Carefully Inspected, Cleaned and Tumbled.

FINE MACHINERY CASTINGS.

HARDWARE SPECIALTIES.



DUMBBELLS, TIE WEIGHTS, QUOITS.

Cast Jack Screws, Bench Anvils and Stove Pipe Thimbles.

DRILLING, JAPANNING, COPPERING

Freight paid to principal points in New England and New York. Correspondence Solicited.

**SPRINGFIELD FOUNDRY CO., 93 Liberty St.,
SPRINGFIELD, MASS.**

Boston Office, 141 A Milk St., H. F. LIVERMORE, Agent.



Self-Cocking

AUTOMATIC EJECTING

MARLIN DOUBLE-ACTION REVOLVER.

We desire to call the attention of the public to our New Double-Action Revolver illustrated herewith. No expense or care has been spared to make this arm as near perfection as it is possible to get. The style is identical with the Smith & Wesson Revolver and in no respect whatever is it inferior. Our Rifles have enjoyed the reputation of being superior in workmanship, finish and accuracy of shooting to any others in the world; this position we mean to hold, and the Marlin Revolvers will be found to be in these points, so essential to a high class firearm, equal to anything we have heretofore made. Realizing the immense hold that the S & W. Revolvers have on the markets of the world, by having for a long series of years stood alone as perfectly made weapons, we have made our price sufficiently low to attract the notice of the trade and of the public, feeling confident that as soon as they are sufficiently known they will be duly appreciated and will command as high an estimation as any other goods the world over.

For the present, the 38 cal. will be the only size made, to be followed soon by the 32 cal.

The cartridge used is that known as 38 S. & W., which can be found everywhere. As shown in the cut, the cartridges are extracted automatically by a simple device, and the Revolver can be opened without extracting, if desired. The construction has several novel features which are covered by patents, which bring the Revolver up to highest standard attainable for strength, simplicity, durability, and ease of manipulation.

Retail Price, Rubber Stock, Nickel Plated or Blued, \$11.00.

DISCOUNT TO THE TRADE.

Send for Illustrated Catalogue to

THE MARLIN FIRE ARMS CO.,

New Haven, Conn.

MANUFACTURERS OF
MARLIN & BALLARD RIFLES,
MERRILL BICYCLE LOCKS and
DALEY HAND CUFFS.

THE NEW EASY LAWN MOWER.

The leading mower in the market.
Front Cut. Steel. Open
Roller Traction. Easy
and Noiseless in
Operation

The only mower that will cut
Wet Grass, Narrow
Borders, and close to walls
and fences. Warranted in
every particular.

Manufactured by
BLAIR MFG. CO.,
Springfield, Mass.



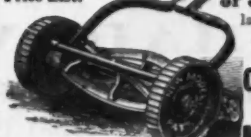
Medium Size "NEW EASY."

LAWN MOWER.

The New Model

Our Latest & Best
MOWER.

Send for Circular & Price List.



CHADBORN & COLDWELL MANUF'G CO.

NEWBURGH, N. Y.

"The World's Favorite"

COVERT'S

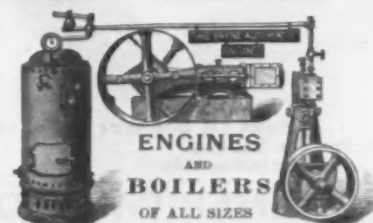
WET UMBRELLA RACK.



Something that everybody wants at sight for their Church Pew, Office, Store, Dwelling and Piazza. It entirely prevents a wet umbrella from soiling anything. The frame is wire, and the drip pan metal, and finished in C plate, or Japanese. The drip pan rests by its rim, therefore easy to detach. The rack is held in place by two screw books which go with it. The price brings it within the means of everybody. The demand for this useful article is world wide, and the invention will be fully covered by letters patent in every civilized country. Order of your Jobber. Price per doz., \$5.00. Will send sample on receipt of price.

E. & J. C. COVERT,

Farmer Village, N. Y., U. S. A.



Write for Circular and tell us what you want.
B. W. PAYNE & SONS, Drawer 3, ELmira, N. Y.
10 S. Canal St., Chicago, Ill. 49 Dear St., New York.
Our patented Vertical Boiler will not prime. No danger of burning flues.

A NEW DEPARTURE! The Smith & Wesson Hammerless, Safety REVOLVER

Calibres 32 and 44 in Preparation.
Provided with Automatic Shell Extractor Rebounding Lock.



Calibre 38, Weight 18 1/2 oz now ready.
The Latest Production from the Works of SMITH & WESSON, Springfield, Mass., Manufacturers of Superior Revolvers, both Double and Single Action.

Absolute Protection from Accidental Discharge Insured.
Superiority in Every Point Universally Conceded.

SEND FOR DESCRIPTIVE CIRCULAR

AXLEINE GUN POWDER



is a fine quality of Axle Grease, put up in square tin boxes containing one pound, beautifully decorated in assorted colors, designed especially for the Hardware Trade. Showy and attractive shelf goods.

Send or sample and prices.

LOVELL TRACY & CO. 71 Asylum St., Hartford, Conn.

LAFLIN & RAND POWDER CO.,

No. 29 Murray Street, New York.

Manufacture and sell the following celebrated brands of Sporting Powder, known everywhere as

Orange Lightning, Orange Ducking, Orange Rifle.

More popular than any Powder now in use.

BLASTING POWDER and ELECTRICAL BLASTING APPARATUS. MILITARY POWDER on hand and made to order.

Safety Fuse, Frictional and Platinum Fuses. Pamphlets showing sizes of grain sent free.



THE "BUCKEYE" JUNIOR LAWN MOWER
MANUFACTURED BY
MAST TOOS & CO.
SPRINGFIELD, O.

ALSO MANUFACTURERS OF THE
Buckeye Hose Reel and Lawn
Sprinkler, Buckeye Wrought
Iron Fencing, Buckeye
Force Pump,
—AND—
Iron Turbine Wind Engines

SEND FOR CIRCULAR AND PRICE LIST.

NICKEL ROLLING CO., Lim., SCHWERTZ, (WESTP.), DR. FLEITHMANN'S PATENT.

Manufacturers of Pure Nickel Sheets, Pure Nickel Wire, Iron Wire Coated with 20% Nickel and Iron Sheets Coated with 5 and 10% Pure Nickel (welded on) of different sizes and thickness.

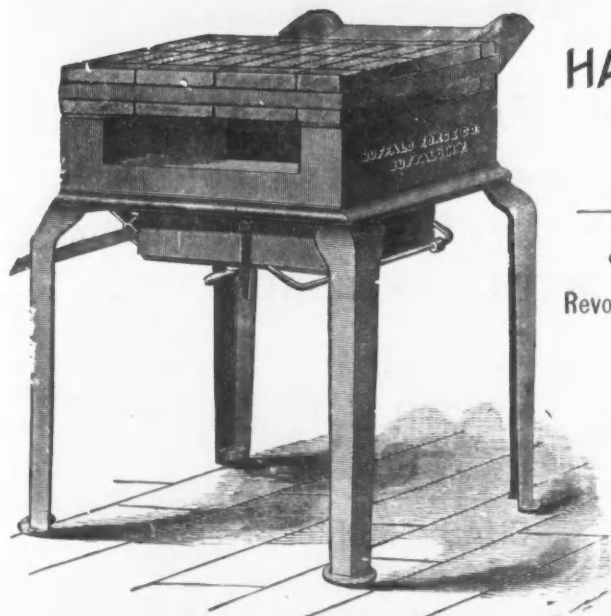
WM. PAULSEN, 10 Burling Slip, Sole Agent for the U. S.

Also Sole Agent of the Stolberg Co.'s Selected Lead and the well-known brand of S. S. Spelter.

J. E. QUACKENBUSH & SON,
MANUFACTURERS OF
Porcelain, Mineral & Jet Knobs & Escutcheons
Send for Price List Office and Salesrooms:
and Terms. 213 & 215 W. 37th St., N. Y.



BUFFALO HEATING FORGES



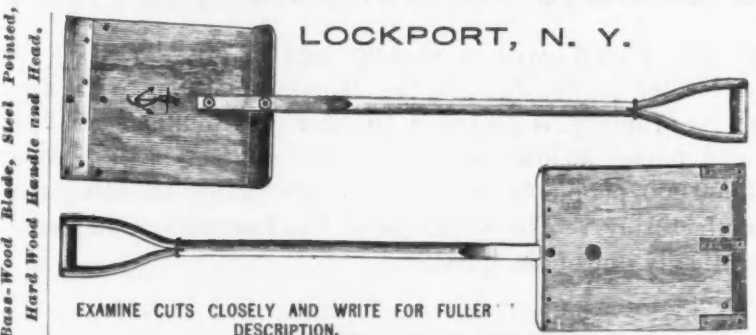
FOR
HARD COAL
OR
COKE.

COMPLETE WITH
Revolving Shaker Grates
AND
Blast Gate.

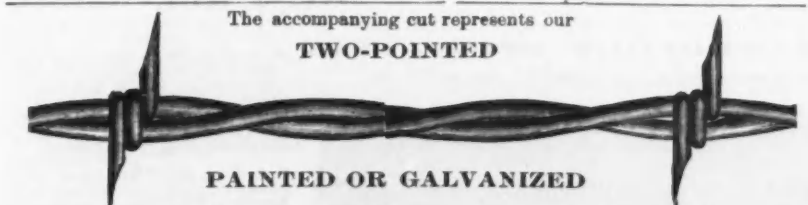
MADE IN
Ten Sizes
AND
Styles
FOR ALL CLASSES OF WORK.

BUFFALO FORGE COMPANY,
BUFFALO, N. Y.

PENFIELD BLOCK COMPANY,
LOCKPORT, N. Y.



N. Y. Agency, **HENRY B. NEWHALL COMPANY.**



Barbed Fence Wire.

MANUFACTURED BY
OHIO STEEL BARB FENCE CO., CLEVELAND, O.
Cut of our four-pointed wire will appear next week. Prices lowest. Quality best. Correspondence solicited.

THE EMPIRE METAL SPIRIT LEVEL, WITH DOUBLE PLUMB.
Glasses are immovable. No Parts to Work Loose. Glasses Perfectly Protected. Made Entirely from One Piece.



The Most Durable, Simple in Construction and Cheapest Iron Level on the Market.
Manufactured by **GREENE, TWEED & CO., 83 Chambers St., New York.**

HUSSEY, BINNS & CO.

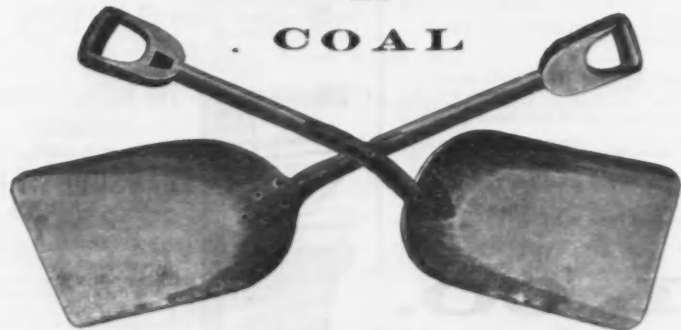
(LIMITED),
PITTSBURGH, P.A.,

MAKE A SPECIALTY OF

Railroad, Contractors' and Miners' Shovels,

—AND—

COAL



Also call special attention to their
NEW PATTERN SMOOTH BACK COAL BARGE SCOOP.



Prices Quoted on Application.

J. C. McCARTY & CO., Direct Representatives,
97 Chambers St. New York.

VULCANIZED FIBRE CO.,

Sole Manufacturers of

Hard Vulcanized Fibre,

For Electrical Insulation, Friction
Brakes, Engine Gibs and
Mechanical Uses.

Flexible Vulcanized Fibre,

For Water and Oil Packings
Pump Valves, Carriage Axle
Washers and General
Purposes.

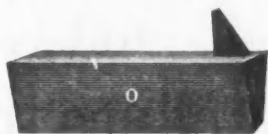
Cheaper and Better than Leather or Rubber

Send for Circulars and Price Lists.

No. 14 Dey St., New York.

P. F. BURKE,
Successor to C. F. Dewick & Co.,
Manufacturer of

**PATENT STEEL
Toe Calks,**



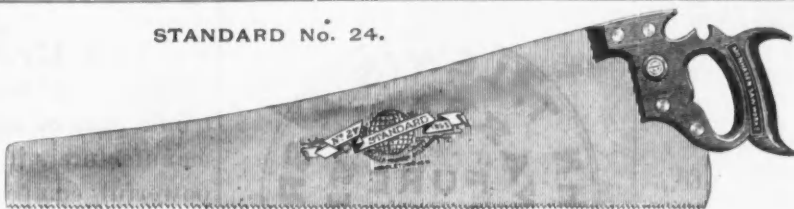
360 Dorchester Avenue Boston W. M.

HOLLOW

THIN

BACK.

STANDARD NO. 24.



LIST, \$20 PER DOZEN.

WHEELER, MADDEN & CLEMSON MFG. CO.,
Middletown N. Y.

VIRGINIA NAIL AND IRON WORKS COMPANY,
LYNCHBURGH, VIRGINIA.

NAILS and Bar Iron of Superior Finish, made exclusively from Pig Iron.

Patented Articles of
MALLEABLE IRON.

NEW pattern Heavy Screw Clamps.
Strongest in the market.



HAMMER'S MALLEABLE IRON OILERS, 3 Sizes.

HAMMER'S WALL IRON HAND LAMPS.

HAMMER'S M. I. HANGING LAMPS.

HAMMER'S ADJUSTABLE CLAMPS.

For sale by all the principal Hardware Dealers.

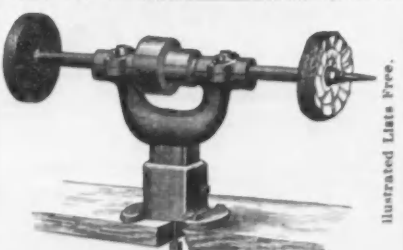
Send for Price List.

MALLEABLE IRON CASTINGS

of superior quality, and Hardware Specialties in
Malleable Iron made to order.

HAMMER & CO.,

Branford Conn.



Adjustable Buffers and Grinders,

SPINNING LATHES, CIRCULAR SAWS, &c.

P. FRYBELL, 467 W. 40th St., New York.



The Strongest and Best Wheelbarrow is

DREYFUS'

Corrugated Steel Wheelbarrows.

J. G. Dreyfus & Co.,

56 Park Street, New York.

Hudson's "Rocking Table"
APPLE PARER.



Livingston Nail Co., Agents,
104 Reade Street,
New York.

Extra Temper.
Superior Finish.
Patent Handle

The best and cheapest Hand
Saw in the market.

Gate City Stone Filter Co.,

Office and Salesroom at

46 Murray Street,

Manufacture and Depot at

UNION PORCELAIN WORKS,

GREENPOINT, N. Y.

**Impure Water is Poison. Best
Filter ever Invented.**

Price \$3.75 to \$41.25 each,
according to size and style.



This open cut represents
our China Filters with Filter
Disc and
Patent Ice Chamber.
By this arrangement the fil-
tered water is cooled with-
out mingling with the ice.

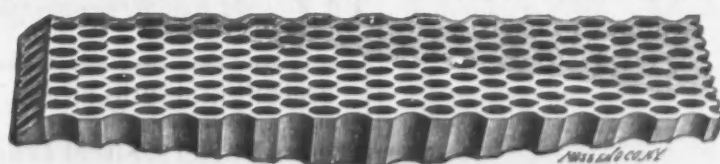
Cheap Stone Jar Filters for the kitchen. Fine Porcelain (with Ice Chambers) for
dining-rooms, halls and offices. **Lasts a lifetime without change. NO
METAL USED.** All common metals generate poison when in contact with water.
**No Charcoal, Sand or other Compound used. They all absorb, re-
tain and become foul with Living Organisms. Charcoal has no
Chemical effect on water. Our Filtering Medium is a Natural Stone.**
No matter whether the impurities are organic or inorganic, they are left on the surface
of the stone, which is as easily cleaned as an ordinary water pail or pitcher.

For Circulars, Price Lists and Discounts address New York Office.

THE UNION PORCELAIN WORKS manufacture Hard Porcelain Insulators, large
and small, for Telephone, Telegraph and Electric Work, Door Plates
and Hardware Trimmings.



HOOPER'S 70% GRATE BAR.



Will not Warp. Will not burn off at the ends. Will give absolutely 70% air space.
Will give uniform combustion of fuel.
Send for Circular and Price List to **ALEXANDER TRAUD,**
KANT FERRY STREET IRON WORKS,
NEWARK, N. J.

CHAMPION BLOWER AND FORGE CO.,

LANCASTER, PA., U. S. A.,

MANUFACTURERS OF



The Champion Steel Pressure Blowers,
Fan Blowers, Exhaust Fans,

To suit every possible situation and kind of work.

ALSO A FULL LINE OF

Lever & Crank Blowers, Portable Forges, Stationary Forges,

Blacksmith's Drills,

Tire Benders, Tuyere Irons,
&c., &c., &c.

NOTICE.—The valuable feature of our
Power Fan Blowers and Steel Pressure
Blowers is our Champion Journal Box. It has
a universal adjustment whereby it comes
readily into perfect line with the shaft.

REMEMBER

our goods are sold strictly on their merits, and each and every article sold is guaranteed to
give entire satisfaction. Write for our 64 page catalogue.



THE CONROY FASTENER.

Used on Ice Houses, Refriger-
ators, Street Cars, Closet
Doors, Show Cases, &c.
The best and cheapest.

P. J. CONROY & CO.,

Pat. Dec. 15, '85. 1605 Catharine Street, Phila.

Grindstones, Emery, &c.

The Cleveland Stone Co.,

Manufacturers of

Grindstones, Mounted Stones,

Scythe Stones, &c., Building

Stone and Sawn Flagging.

Cleveland, Ohio.

BRANCH OFFICES

7, Erie and Kingsbury Sts., Chicago, Ill.; 19 Milk St.,
Boston, Mass.; 407 Walnut St., Philadelphia,
Pa.; 49 Fifth Ave., Pittsburgh, Pa.

LAKE HURON STONE CO.

MANUFACTURERS OF

Lake Huron Grindstones, Mounted
Stones, Scythe Stones, &c.,
also Ohio Grindstones,

672, 674, 675, 677 Atwater St., Detroit, Mich.
34 and 36 Roberts St., Chicago, Ill.

WRITE FOR OUR NEW ILLUSTRATED CATALOGUE IN
COLORS. OUR "HURON CHIEF" AND "MICHIGAN" ARE
THE LATEST AND BEST IMPROVEMENTS IN MOUNTED STONE,
HAVING ADVANTAGES OVER ALL OTHER KINDS.
Compare our Prices and Goods with others.

Walter R. Wood, GRINDSTONES.

Berea, O., Nova Scotia & other brands.

283 and 285 Front St., New York.

GEO. CHASE.

Genuine Green Paper Brand Wash-
ita Stone is the Best

OIL STONE.

7th St., Harlem River, N. Y.



Pike's Indian Pond, Black Diamond, La-
moille, Green Mountain, Rag, Mowing Ma-
chine, German Pattern, Round English, Vi-
enna, Gritty Pearl, Chocolate, Scythes, Ar-
kansas, Washita, Turkey, Nova Scotia, Hin-
dostan, Sandstone, Imported Razor Hones,
Table Hones, Scythe Rifles, Grind Stones, &c.



PIKE CO. STATION, N.H. U.S.A.

JOHN T. LEWIS & BROS.,

Successors to MORDECAI LEWIS.
Established 1772.



White Lead in oil, the most reliable for White
ness, Fineness, Body, and Covering Capacity.
RED LEAD, Litharge and Orange Mineral.
PAINTERS' COLORS of a Very Superior Quality
LINSEED OIL, Raw Boiled and Refined.



ATLANTIC WHITE LEAD
and LINSEED OIL CO.,

MANUFACTURERS OF

ATLANTIC PURE WHITE LEAD, unequalled for Uniform
Whiteness, Fineness and Body. The most reliable White
Lead made. RED LEAD and LITHARGE.

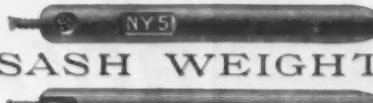
RAW, REFINED, LINSEED OIL and Boiled

287 Pearl St., New York.



Manufacturers' Agents: The Alford & Berkeley Co.,
77 Chambers St., N. Y.; Dennison & Hamilton, 144 Lake
St., Chicago; Burrage, Riddell & Cornish, 31 Pearl St.,
Boston, Mass.; H. Atwood & Son, 7 E. Lombard St., Bal-
timore, Md.; O. McQuillan & Son, 76 Weybosset St.,
Providence, R. I.; Thos. Kirke & Co., Atlanta, Ga.

PATENT EYE



SASH WEIGHT,

W. A. ROSS & BRO., 56 Pine St., City.



"ENGLISH TROUSERS' STRETCHER"
Green, Cadbury & Co.
Patented in every nation.
His use makes Old Trousers appear new. Price \$1.75, \$3.00 for 3 pairs.
Trousers appear new. Price \$1.75, \$3.00 for 3 pairs.
E. O. THOMPSON, 133 Chestnut St., Philadelphia.
WHOLESALE DEPOT:
& C. McCARTY & CO., 97 Chambers Street
Trade List and Circulars on application.

ENTERPRISE BOILER CO.,

MANUFACTURERS OF

Steam Boilers, Sheet Iron
and PLATE WORK OF ALL DESCRIPTIONS,

YOUNGSTOWN, OHIO.



R. WALLACE & SONS' MANUFACTURING COMPANY,

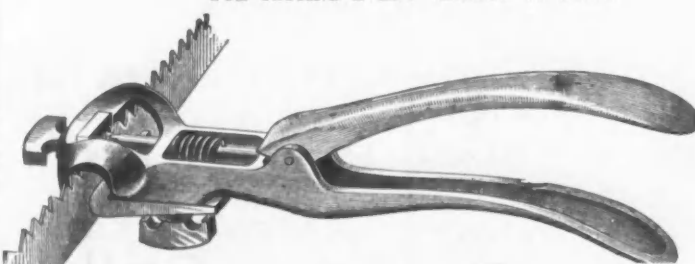
MANUFACTURERS OF SOLID SILVERWARE GUARANTEED FINE, ALSO NICKEL SILVER HOTEL AND TABLEWARE.

Factories, WALLINGFORD, CONN.

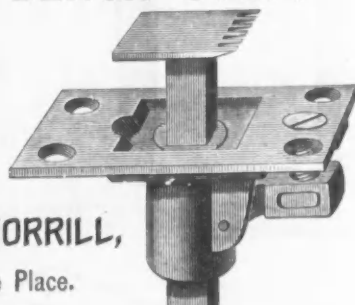
New York House, 21 PARK PLACE.

MORRILL'S PERFECT SAW SETS AND BENCH STOP.

FOR SETTING EVERY VARIETY OF SAWS.



For price lists
and discounts
Address



CHAS. MORRILL,

64 College Place.

NEW YORK.

GREAT OFFER TO MANUFACTURERS

To Induce them to Locate in St. Paul, Minn.

The Union Land Co., of St. Paul, with a paid-up capital of \$2,000,000, owning magnificent manufacturing sites located in St. Paul, on the Mississippi River, with two trunk lines of railroad passing through its property, is prepared to offer great inducements to manufacturers in the way of free sites and money at low rates of interest, and the backing of a powerful company. The trade of 4,000,000 people is tributary to this point, affording the greatest opportunity for successful manufacturing. The workings of the Interstate Commerce bill will render Eastern competition practically out of the question.

For particulars, address

UNION LAND CO. OF ST. PAUL,

St. Paul, Minn.

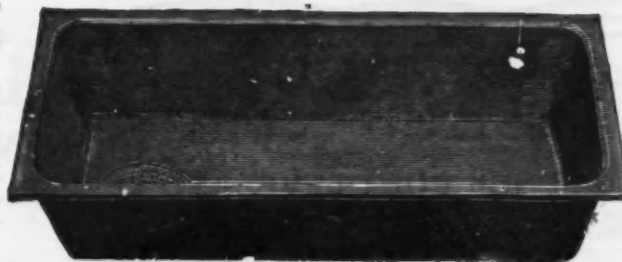
THE COLUMBUS WROUGHT STEEL SINK

FOR BUTLER'S PANTRY AND KITCHEN. (Pat. April 12, 1881.)

Entirely new, being stamped from
one plate of steel and superior to
cast-iron sinks in every particular,
being lighter, stronger and more
durable.

These sinks, being made of
wrought steel, will not break from
heat, cold, or any cause whatever.

We furnish these sinks painted or
galvanized, as desired, at prices
freedom from breakage consid-
ered—less than for sinks made
from cast iron.

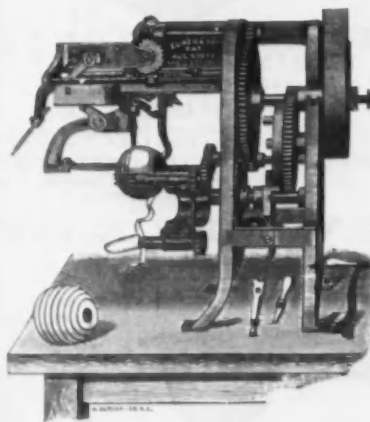


THE KILBOURNE & JACOBS MFG. CO., Sole Manufacturers, COLUMBUS, OHIO.

AGENTS:
W. & B. DOUGLAS, Middletown, Ct.
and N. Y. City, Agents for New
England, N. Y. City and Export.
Jas. B. Clow & Son, Chicago, Ill.
L. M. HUBERT MFG. CO., St. Louis, Mo.
BAILEY, FARRELL & CO., Pittsburg, Pa.
McINTOSH, GOOD & HUNTINGTON,
Cleveland, Ohio.
C. A. BLESSING, Philadelphia, Pa.
SIDNEY SHEPARD & CO., Buffalo, N. Y.
KENNEDY, SPAULDING & CO.,
Syracuse, N. Y.
GLEASON & BAILEY MFG. CO.,
Seneca Falls, N. Y.
JAMES ROBERTSON & CO., Baltimore
HARPER, REYNOLDS & CO.,
Los Angeles, Cal.
GOULDS & AUSTIN, Chicago, Ill.
HOLBROOK, MERRILL & STETSON,
San Francisco, Cal.
THE SILVER & DENING MFG. CO.,
Salem, Ohio.

EUREKA '86

APPLE PARING, CORING AND SLICING MACHINE



Last season I used your 1886 Eureka (4 machines)
which gave the best satisfaction of any machine I have
ever used. Had no trouble in making 50 bushels per
day in 10 hours on each machine, hand power.
(Signed) ALFRED DRIEL,
Johnson's Creek, Niagara Co., N. Y., Jan. 3, '87.

It is no trouble for a woman to pare 65 bushels of
apples in 10 hours on the Eureka, and the work done
is superior to any machine we ever saw used. We
are using steam power.
(Signed) C. H. FITTS & CO.,
Blissfield, Mich., August 24, '86.

We have had the pleasure of a comparison or test
with the Eureka '86 and the big machine of Canada,
and we claim an easy walk away for the Eureka. We
call it the best machine we ever saw, and think it
without doubt the best machine made. Shall want
one or two more soon.
(Signed) OVID FRUIT AND VEGETABLE DRYER,
Ovid, Mich., August 14, '86.

The Eureka 1886 we used about three weeks. It
works complete. It will pare 100 bushels per day
when run by power. We think it durable and most
rapid. It does the best work of any hand or power
machine we have ever used.
(Signed) HARDING & SWEETING,
Barker's, N. Y., June 21, '86.

By using your power machines I saved fully
\$100.00 last year.
(Signed) SAM T. BROWN,
Carbondale, Ill., June 29, '87.

GOODSELL CO.

Antrim, N. H.

Double
Acting
Spring

BUTTS

SABIN'S LEVER DOOR SPRINGS

Coil, and Sabin's Volute Springs

For various purposes made to order.

SABIN MACHINE CO. Montpelier Vt.

STRAP HINGES, JAMES MANN & SONS,

with Hinge Iron at 2 cents. Hinges can be made at a good profit to sell them at 70 and 80, the price we are
now selling. Figure H & A Presses, a Roller, Counterlinker and Riveter can produce more than a ton a day
of 8 in. Heavy Strap, with the labor of 9 boys at \$3.00 per week. We want to see more factories. There is a
good field open for 5 factories West. The secret about the business is the Roller. Will give the points to any
party who will start in West or South.

E. W. POORMAN & CO.,

MAKERS OF

PATENT

Combined Heater,

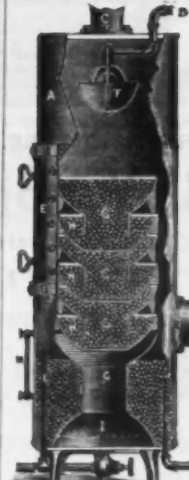
Filterers, Lime

EXTRACTORS.

Don't fail to write for
new Illustrated Cata-
logue giving prices and
full information.

AGENTS WANTED.

CANTON, O.



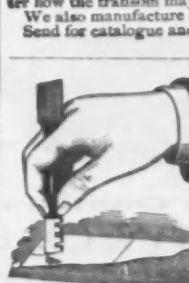
The Reither Improved "CHAMPION" Self-Locking TRANSCOM LIFTER

F. A. REIHER,

Manufacture.

11-13 S. Canal St. CHICAGO.

A represents the stationary
guiding and locking bar which
receives the operating rod C.—
B forms with arm E & bracket
F the connection with the trans-
om. D is the adjustable guide
to hold the guiding & operating
rod to the door casing. Handle
G in combination with parts A
& C forms a novel locking de-
vice and will hold the transom
in any desired position no mat-
ter how the transom may be hinged.
We also manufacture several other devices.
Send for catalogue and price list.



MONCE'S

Novelty Glass Cutters

are the standard.

No. 17 Just Out.

Send for Illustrations

and Prices.

We also make the

Compartments Font In-

terchangeable Lock

Stencils that are hav-

ing such a run.

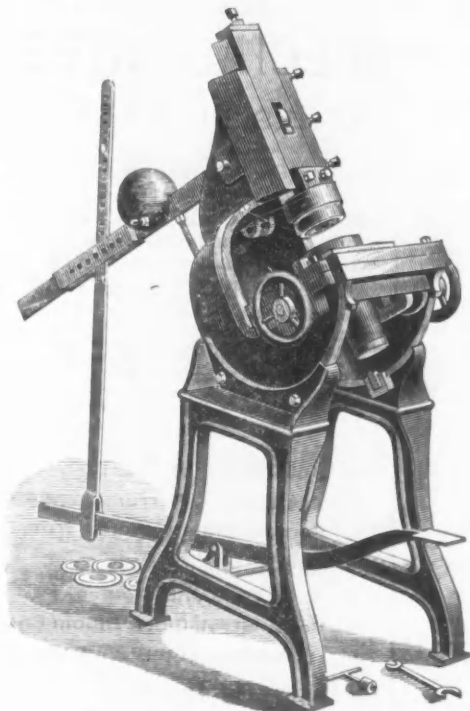
S. G. Monce,

BRISTOL, CONN.

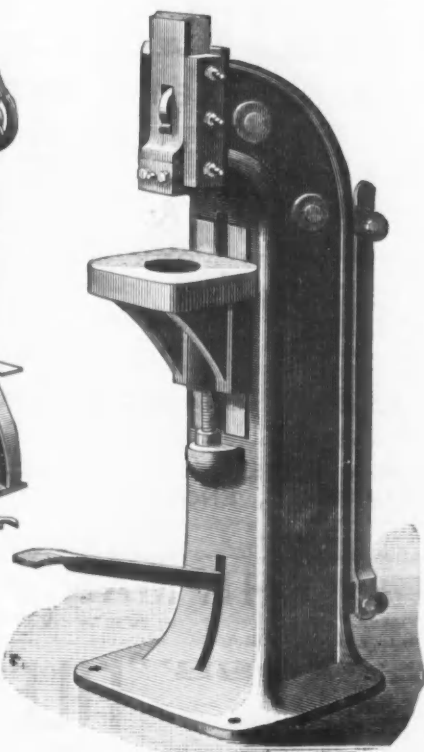
E. W. BLISS CO.,

No. 17 Adams Street,

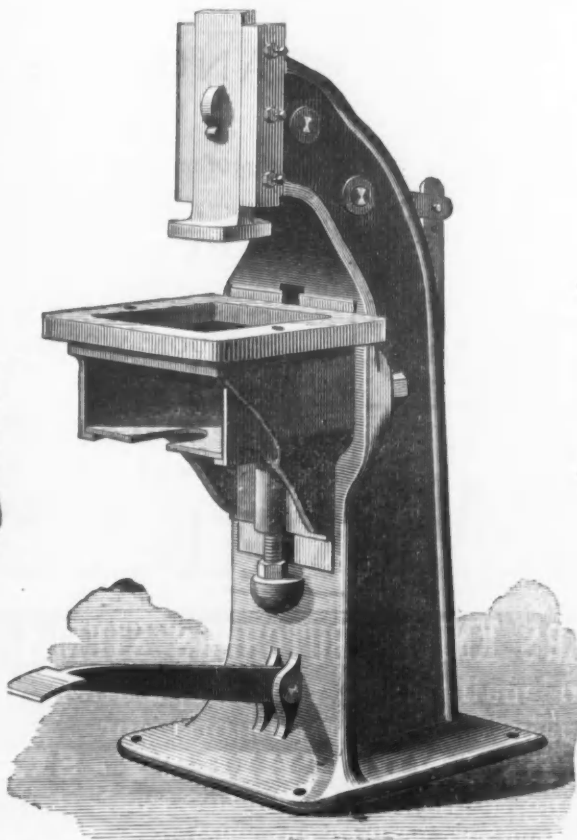
Brooklyn, N. Y.



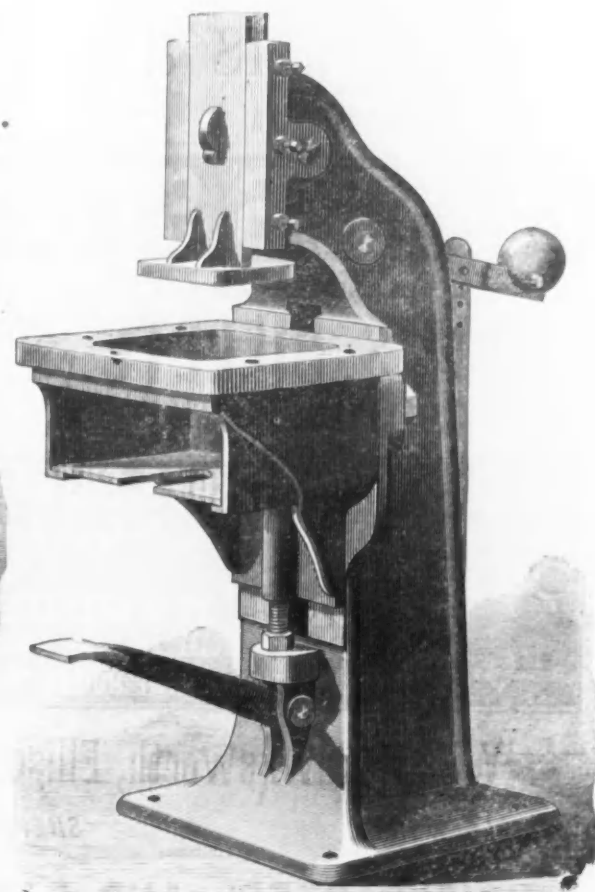
Adjustable Lever Press No. 10.



No. 86 Lever Press.



No. 87 Lever Press.



No. 88 Lever Press.

Builders of

Drawing Presses. Power Presses. Foot Presses.
Drop Presses, for Forging and Stamping.
Double Seaming Machines, for round, square
and oval work.
Circular Shears, Hand and Power.
Squaring Shears, Foot and Power.
Canning Machinery.
Dies of every description.
Tools for working Sheet Metals.
Petroleum Can Machinery.
Special Machinery.

Send for Circulars.

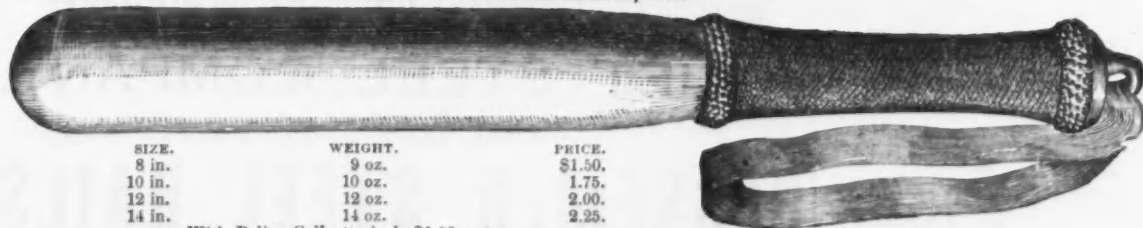


PATENT POLICE HOOK.
PATENTED NOV. 4, 1883.
WEIGHT, 4½ ozs. PRICE, \$1.25.

BEAN'S PATENT POLICE EQUIPMENTS.

SOLE LEATHER POLICE CLUBS.

PATENTED SEPT. 29, 1874.



SIZE.	WEIGHT.	PRICE.
8 in.	9 oz.	\$1.50.
10 in.	10 oz.	1.75.
12 in.	12 oz.	2.00.
14 in.	14 oz.	2.25.

With Police Call attached, \$1.00 extra.
20,000 of these Clubs have been sold with an increasing demand.



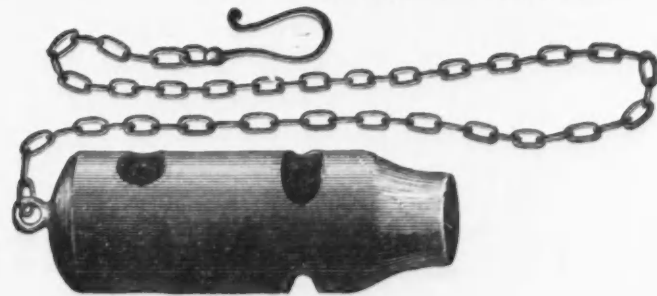
IMPROVED CHAIN TWISTERS.
PATENTED MAY 6, 1884.
WEIGHT, 3 ozs. PRICE, \$1.00.



BEAN'S
PAT.
HAND-CUFFS.
No. 2, Or PRISON HAND-CUFFS.
PATENTED NOV. 23, 1882.
Weight, 17 ozs.
PRICES:—NICKEL PLATED, \$4.75. POLISHED, \$4.00.



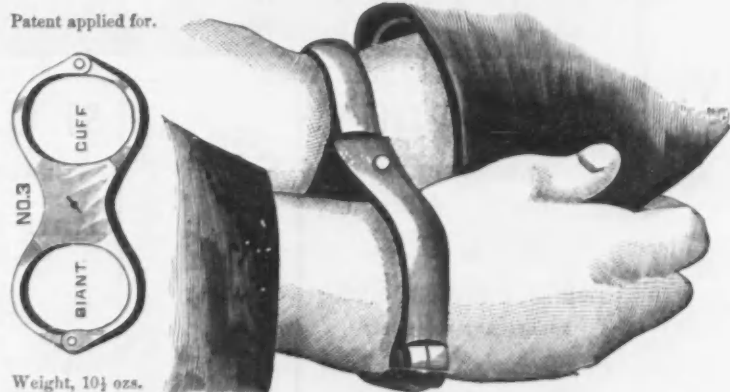
BEAN'S
PAT.
HAND-CUFFS.
No. 1, Or PATROLMAN'S HAND-CUFFS.
PATENTED NOV. 23, 1882.
Weight, 14 ozs. NICKEL PLATED, \$4.75. POLISHED, \$4.00.



POLICE CALL.
PATENTED OCT. 23, 1881. PRICE, \$1.00.



SINGLE HAND-CUFF, WITH LOOP.
For Conveying a Prisoner aboard a railroad train.
Weight, 8 ozs. PRICE, \$3.50.



Weight, 10½ ozs.

GIANT HAND-CUFFS, AS THEY APPEAR ON THE WRISTS.
PRICES:—Plated, with Pocket, \$6.50. Plated, without Pocket, \$6.00.
Impossible for the Prisoner to remove them from his wrist either with or without the key.



LET IRONS.
PATENTED NOV. 23, 1882. Weight, 21 ozs.
PRICES:—NICKEL PLATED, \$7.00. POLISHED, \$6.00.

BEAN'S BREECH-LOADING GUN CANE.
PATENTED NOV. 3, 1885.

The most powerful and compact Gun Cane ever made, and the only one
with a Dropped Stock and Shoulder Rest.
Send for Catalogue.

JOHN P. LOVELL ARMS CO.

Manufacturers of Champion Single Guns, Double and Single Action Revolvers, Air Rifles, Air Pistols, Bean's Police Goods.

AGENTS FOR THE SPRINGFIELD ROADSTER BICYCLE.

BOSTON, MASS., U. S. A.

S. & C WARDLOW SHEFFIELD, ENGLAND,
MANUFACTURERS OF THE CELEBRATED
Cast and Double Shear Steel
In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Razors,
Table Knives, Mining Tools, Dies, Files, Clock, Watch
and other Springs, and Sole Makers of the
Special Brand "Tough" Cast Steel for
Turning and other Tools.

OFFICES AND WAREHOUSE,
5 JOHN STREET, NEW YORK.

FRANK S. PILDITCH, Agent.

W. W. SCRANTON President. WALTER SCRANTON Vice-President. E. P. KINGSBURY, Sec'y and Treas.

THE SCRANTON STEEL COMPANY,
MANUFACTURERS OF
Steel Rails and Billets.
Works at SCRANTON, PA. NEW YORK OFFICE:
47 BROADWAY.

JESSOP'S STEEL 91 John St., NEW YORK.

BESSEMER AND OPEN-HEARTH
BLOOMS, BILLETS AND SLABS.
H. E. COLLINS & CO., 34 Lewis Block, Pittsburgh, Pa.

TRADE MARK. **JOHN WILSON'S BUTCHERS' KNIVES, BUTCHERS' STEELS, & SHOE KNIVES.** Works.
Have established and maintained their reputation, for superiority,
against all Competitors, for
ONE HUNDRED AND THIRTY-SIX YEARS,
and are still in increasing demand. As in the past, it is the unalterable
DETERMINATION OF THE HOUSE TO SEND OUT NOTHING BUT WHAT IS OF THE HIGHEST POSSIBLE QUALITY.

Wilson Hawksworth, Ellison & Co.,
CARLISLE WORKS, SHEFFIELD, ENGLAND.
(ESTABLISHED 1825.)

CRUCIBLE STEEL AND STEEL WIRE.
WETHERELL BROS., Agents,
31 OLIVER STREET BOSTON. 115 LIBERTY STREET. NEW YORK.

THE STANDARD IRON COMPANY.
MANUFACTURERS OF
SHEET IRON AND SHEET STEEL,
COMMON OR SMOOTH FINISH.
+ CORRUGATED +
ROOFING, CEILING AND SIDING,
STRAIGHT OR CURVED.

Bridgeport, - - - Ohio.

MILD CRUCIBLE STEEL CASTINGS
FREE FROM BLOW HOLES.

On account of softness of metal but slight annealing is required to relieve stresses therefore
hurried orders can be filled in three or four days after receipt of patterns. The material can be
worked in machine, forged and welded without difficulty. Gears, Pinions, Cranks, Cams, Cross
Heads, Rocker Arms and all descriptions of Machinery Castings manufactured by the

SYRACUSE STEEL FOUNDRY,
FRAZER & JONES CO., Proprietors,
SYRACUSE, - - N. Y.

THE MONTGOMERY IRON & STEEL COMPANY,
WORKS AT DANVILLE PA.
PIG IRON, T AND STREET RAILS,
Light Rails, 12 to 40 lbs. per yard.

RAIL JOINTS SPIKES AND BAR IRON.

W. E. C. COXE, President, Reading, Pa. T. F. McGINNES, Gen'l Supt., Danville, Pa.

STEEL Gautier Steel.
SEE PAGE 3.

SMITH BROS., & CO.,
LA BELLE STEEL WORKS,
Ridge Ave. and Belmont St., Allegheny City, Pa.
Post Office Address, Pittsburgh, Pa.
MANUFACTURERS OF ALL KINDS OF
STEEL
SPRINGS, AXLES, RAKE TEETH, ETC.

WETHERELL BROS., Eastern Representatives,
31 Oliver St., Boston, and 115 Liberty St., N. Y.

C. E. JAMES & CO.,
Chattanooga, Tenn.

FRANCIS HOBSON & SON,
97 JOHN STREET NEW YORK.
Sole Manufacturers of "CHOICE" EXTRA CAST STEEL.
MANUFACTURERS OF
Warranted Best Cast Steel
FOR TOOLS AND DIES, AND
"CHOICE" EXTRA NEEDLE WIRE.
DON WORKS, SHEFFIELD, ENGLAND.
CHAS. HUGILL, Agent.

NEWTON & SHIPMAN,
83 JOHN ST., NEW YORK.
GENERAL AGENTS FOR
STEEL "F. W. MOSS" FILES.
"MOSS & GAMBLE'S"

TROY STEEL AND IRON CO.,
TROY, N. Y., Manufacturers of
BESSEMER STEEL RAILS,
Fish Plates, Bolts, Nuts, Spikes, &c. Machinery
Steel, Merchant and Ship Iron.

H. H. ROGERS, President, 26 Broadway, New York City.

CRESCENT STEEL WORKS.
MILLER, METCALF & PARKIN.
480 PEARL ST. NEW YORK. 64 & 66 S. CLINTON ST. CHICAGO.

JOLIET STEEL COMPANY,
MANUFACTURERS OF
BESSEMER STEEL RAILS
OF ALL WEIGHTS.

A. J. LEITH, President, 11 Pine St. New York. H. S. SMITH, General Supt., Joliet, Ill.
Home Insurance Building, Chicago, W. B. STIRLING, Treas. J. C. STIRLING, Secy.

J. S. SEAMAN
ROBT. SLEETH
GEO. BLACK
PHOENIX ROLLWORKS
SEAMAN, SLEETH & BLACK
SUCCESSORS TO
JAMES B. YOUNG & CO.
410 & 412 BAYVIEW
PITTSBURGH
ESTABLISHED 1870
MANUFACTURERS OF
PATENT SEMI-STEEL
CHILLED
SAND
ROLLS
& PINIONS
PATENTEES AND SOLE
MANUFACTURERS OF
THE WELL KNOWN
SEMI-STEEL ROLLS
& PINIONS.

STEEL RAILS
T AND STREET
Open Hearth and Bessemer
STEEL.
Blooms, Slabs and Billets
ROLLED AND HAMMERED
For Boiler, Ship & Tank
Plate, Structural
Purposes,
Nails, Wire, Etc.

MACHINERY STEEL,
Rounds, Squares and Flats.
STEEL SHAFTING,
Hammered and Rolled.

Pennsylvania Steel Co.,
STEELTON, PA.
Gen'l Office, 208 South 4th St., Philadelphia, Pa.

STEEL FORGINGS
HEAVY AND LIGHT.
Rail Fastenings,
Spikes, Etc.
Crossings, Frogs Switches.
Switch Stands of any
required patterns.
Magnetic-Electro Signals
For Protection of Roads and
Crossings.
Correspondence Solicited.

R. MUSHET'S
SPECIAL STEEL
FOR
LATHES, PLANERS, &c.,
Turns out at least DOUBLE WORK by increased speed
and feed, and CUTS HARDER METALS than any other
Steel. Neither hardening nor tempering required.
SOLE MAKERS
SAMUEL OSBORN & CO.
SHEFFIELD, ENGLAND.
Represented in the United States by
B. M. JONES & CO.,
Nos. 11 and 13 Oliver Street, BOSTON.

NAYLOR & CO.
99 John Street, New York.
Iron Ores, Bessemer Pig Iron,
Spiegelisen, Ferromanganese
Ferrosilicium, Scrap Iron,
Steel and Iron Wire Rods,
Norway Bars and Shapes,
Scrap Steel, Rail & Bloom Ends
Old Iron and Steel Rails,
Tin Plates, Pig Tin,
Spelter, Lead, Sheet Zinc,
Iron and Steel Beams,
Steel Rails, Tires & Axles,
Steel Blooms, Slabs, Bars, and Hoops,
Cotton Ties.

The Iron-Masters' LABORATORY.

Exclusively for the
Analysis of Ores of Iron, Pig and Manufact
ured Iron, Steels, Limestone, Clays,
Slags and Coal for Practical
Metallurgical Purposes.
No. 339 Walnut St., Philadelphia.
With Branch at Warrenton, Virginia.
J. BLODGET BRITTON.

This laboratory was established in 1866, at the in
stance of a number of practical Iron Masters, ex
pressly to afford prompt and reliable information
upon the chemical composition of the substances
above mentioned, for smelting and refining pur
poses, the object being to make it at once a con
venient, practically useful, and comparatively
inexpensive adjunct to the Furnace, Forge and
Rolling Mill.

THE BOLTON STEEL CO.
CANTON, OHIO,
MANUFACTURERS OF BEST REFINED

TOOL STEEL
And other Fine Grades of
CAST STEEL.

WANTED TO BUY
IRON AND STEEL
SCRAP,

Old Iron Rails,
No. 1 Wrought Scrap,
No. 1 Cast Scrap,
Cast Borings,
Wrought Turnings,
Axle Turnings,
Burnt Iron,
Pipes, Tanks and Sheets,
Old Shafts,
Iron Car Axles,
Flaw Points,
Store Plate,
Old Steel Rails,
Leaf Springs,
Coil Springs,
Locomotive Tires,
Steel Car Axles,
Wagon and Buggy Springs,
Steel Turnings,
Flaw Steel,
Steel Wire Rope,
Saw Gumming,
Tool Steel,
Crop Ends.

JAMES H. LOGAN,
PENN BUILDING, - PITTSBURGH, PA.

EUREKA
SHOW CASE CO.,
JOS. MONK, Manager,
208 and 210 Lake St., Chicago.
Buy direct from us and save commissions
Write for Price List.

A. PARDEE, Hazleton, Pa. J. G. FELL Phila.
A. PARDEE & CO.,
237 South Third Street,
PHILADELPHIA.

No. 111 Broadway, New York.
MINERS AND SHIPPERS OF
LEHIGH COALS

The following superior and well-known Lehigh
Coals are mined by ourselves and firms connected
with us, viz.:

A. Pardee & Co., [HAZLETON,
Pardee, Bro. & Co., [CRANBURY
Calvin Pardee & Co., [SUGAR LOAF
Pardee, Sons & Co., [LATTIMER.
HOLLYWOOD
Pardee, Sons & Co., MT. PLEASANT.

THOS. FIRTH & SONS, Lim'd,
SHEFFIELD.
CRUCIBLE CAST STEEL.

JERE ABBOTT & CO.,
Agents and Importers of
SWEDISH IRON,
35 Oliver St., Boston. 23 Cliff St., New York.
GUSTAF LUNDBERG,

AGENT FOR
N. M. HÖGLUND'S SONS & CO.,
OF STOCKHOLM,

Swedish & Norway Iron

38 KILBY STREET, BOSTON.
PAGE, NEWELL & CO.,
139 Milk Street Boston.

IRON, STEEL AND METAL MERCHANTS,
IMPORTERS OF
SWEDISH IRON,
Including Charcoal, Siemens-Martin and Bessemer Productions, Bars, Shapes, Rods, Billets, Blooms.

DELIVERIES MADE AT ALL PROMINENT AMERICAN, CANADIAN AND PROVINCIAL PORTS.

SWEDISH IRON. **CHARLES G. LUNDELL,**
No. 7 Exchange Place, BOSTON, MASS.

SWEDISH IRON AND STEEL
LEWANDER & CO.
Agents for L. G. BRATT & CO., of Gothenburg, Sweden.
Main Office: 12 Post Office Square, Boston, Mass.

STEEL CASTINGS
From 1-4 to 15,000 lbs. WEIGHT.
True to Pattern, sound, solid, free from blow-holes and of unequalled strength.
Stronger and more durable than iron forgings in any position or for any service whatever.
40,000 CRANK SHAFTS and 30,000 GEAR WHEELS of this steel now running to prove this.
Cross-Heads, Rockers, Piston-Heads, &c. for Locomotives.
Send for Circulars and prices to
CHESTER STEEL CASTINGS CO.
Works, Chester, Pa. Office: 407 Library St., Phila., Pa.

MAP OF TRACT FOR SALE OR TO LEASE—1200 feet water front, 4000 feet depth, on line of the Lehigh Valley, the N. J. Central and the Pennsylvania R.R. Roads; 30 feet depth of water in front of property; accessible from Sandy Hook and New York for largest Ocean Steamships. Next Lehigh Valley wharves at Perth Amboy, New Jersey. See advertisement on page 18.
MEREDITH PROPERTY
STATEN I.D.
WILLIAM T. MEREDITH, No. 48 Wall Street, New York.

ELECTRIC LIGHT.

BRUSH ELECTRIC CO.
CLEVELAND, OHIO.

Champion Hog Ringer
CLOSING ON OUTSIDE OF NOSE
Only Double Ring Invented.
RINGS and HOLDER.
The only Ring that will effectively keep Hogs from rooting. No sharp points in the nose.
CHAMBERS, BERING & QUINLAN CO., Exclusive Manufacturers, Decatur, Ill.

BOURKE'S PATENT NONPAREIL Window Cleaner,
The Best in the Market. Why?
1st. It is so constructed that the Rubber can never get out of the barrel without taking out the lock-pin.
2d. It differs from all other Rubber Window Cleaners, for when the edge of the rubber is worn smooth you can, by simply taking the pin out and reversing the edge of the rubber slip and pushing the pin in again, have a new Window Rubber.
3d. It can be used twice again by taking the lock pin out and turning your rubber, using the near edge of the rubber slip and placing it for the outside, then reverse the whole thing again and you will have equal to four Rubber Cleaners.
When the four edges are worn smooth and worthless you can get at any hardware store a two-inch strip of rubber for a few cents and place the rubber in yourself. It is so simple that any child can do it.
For terms and prices address
BOURKE SASH LOCK CO.,
231 E. Federal St., Youngstown, Ohio.

Electro-Plating TO ORDER.

SILVER, GOLD, NICKEL, BRASS AND BRONZE
—ON—
Spelter, Iron, White Metal, &c.
Also Small Castings to order in Spelter in White Metal.

Estimates given on receipt of samples and statement of quantities.
ROGERS SILVER PLATE CO.,
Danbury, Conn.
Dwight E. Rogers, Pres't.
FRED. A. HULL, Treas'r.
N. BURTON ROGERS Sec'y & Sup't.

Iron and Steel Importers and Commission Merchants.

CHAS. G. ECKSTEIN & CO.,

Steel Rails, Tires and Axle Wrought Iron Wheel Centers, Beams, &c.

CONSTRUCTION MATERIAL A SPECIALTY.

American Agents of THE JOHN COCKERILL CO., Sclaving, Belgium.

32 Liberty St., New York

B. KREISCHER & SONS, FIRE BRICK.

BEST AND CHEAPEST.
ESTABLISHED 1845.
Office, foot of Houston Street, East River, NEW YORK.

NEWTON & CO., ALBANY, N. Y.,
MANUFACTURERS OF BEST QUALITY
FIRE BRICK
And STOVE LININGS.

M. D. VALENTINE & BRO.,

MANUFACTURERS OF
FIRE BRICK
And FURNACE BLOCKS.
DRAIN PIPE AND LAND TILE,
Woodbridge, N. J.

BORGNER & O'BRIEN, FIRE BRICK

AND
Edge Pressed Furnace Blocks.
Clay Retorts, Tiles, &c.
Twenty-third Street, Above Race, PHILADELPHIA
Twenty years' practical experience.

ESTABLISHED 1848.
TROY FIRE BRICK WORKS, Troy, N. Y.
James Ostrander & Son, FIRE BRICK,
Tiles, Blast Furnace Blocks, &c., and in a Special Department Linings for Stoves, Ranges and Heaters of superior quality. Miners of and dealers in Woodbridge, N. J., Fire Clay and Fire Sand and Staten Island Kaolin.

ESTABLISHED 1864
JAMES GARDNER, Successor to GARDNER BROS.,
MANUFACTURER OF
'STANDARD SAVAGE' FIRE BRICK, TILE & FURNACE BLOCKS,
OF ALL SHAPES AND SIZES
Miner and Shipper of "Mount Savage" Fire Clay.
WORKS, Ellerslie, Allegheny Co., Md.
MAIN OFFICE, Cumberland, Md., P. O. Box 93.
BRANCH OFFICE, Pittsburgh, Pa., P. O. Box 373.
S. M. Hamilton & Co., Agents, Baltimore, Md.

UNION MINING COMPANY.

MOUNT SAVAGE FIRE BRICK.
Agent for Eastern Penna., West New Jersey and Delaware,
EDWARD J. ETTING,
222 South Third St., Philadelphia, Pa.

BIRMINGHAM FIRE BRICK WORKS.
All dimensions of Firebricks and Shapes, Fire Clay for Furnaces, Coke Ovens, Boilers and Patent Facing Linings. Drain Tile, Street Paving Blocks and Fire-Proof Hollow Bricks for Buildings.
BIRMINGHAM, ALA.
ESTABLISHED 1856.

HENRY MAURER & SON, FIRE BRICK
of all Shapes and Sizes.
420 E. 23d St., New York.
PORTAGE IRON CO. (Lim.),
—MANUFACTURERS OF—
IRON AND STEEL
Bars, Rods, Shafting, Hoops, Bands, Angles, &c.
Made Exclusively from Pig Iron.

Duncansville, Pa.
Freight Rates same as Pittsburgh
A. R. WHITNEY & CO.
SELLING AGENTS,
17 Broadway, P.O. Box 33, New York City.

WOODRUFF'S PATENT CELEBRATED AMERICAN SLEDGING HANGERS.
The Best in the World—And Pulley for Hoisting Troughs. "Little Giant" Combined Shear and Punch. Manufactured by Geo. W. Heartley, Toledo Spring and Variety Works, 302 St. Clair St., Toledo, Ohio.

John McLean,
Manufacturer of Ayer's Hydrants.
Copper Cocks & Galvanized Cemetery Supplies.
290 & 298 Monroe St., N.Y.

UDELL WOODEN-WARE WORKS,



INDIANAPOLIS, IND.

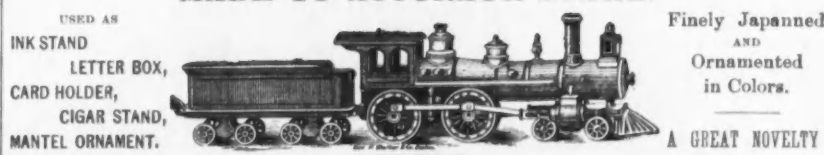
NEW YORK ADDRESS:
79 READE STREET,
Manufacturers of

Rope Reels, Broom Stands,
Step Ladders, Extension Ladders,
Long Ladders, Clothes Bars, &c.

Largest line of Step Ladders in the World. Send for Catalogue.

"THE WILKINS" MODEL LOCOMOTIVE AND TENDER,

21 INCHES LONG.
MADE TO ACCURATE SCALE.



Finely Japanned and Ornamented in Colors.
A GREAT NOVELTY

Made of Malleable Iron. Patent Oscillating Trucks. All Wheels Turn. Perfect Action of Side Rods. A very ingenious and attractive ornament. Made by

THE TRIUMPH WRINGER CO.,

SEND FOR PRICES. **KEENE, N. H.**
C. H. GURNEY & CO., 247 Lake St., Chicago, Ill., Agents for the Northwest.

JESSE JONES & CO.
No. 615 COMMERCE ST.
PHILADELPHIA, Pa.
SHELF BOXES
MADE OF WOOD WITHOUT NAILS OR SCREWS.
SEND FOR CATALOGUE.
PAPER BOXES ALL KINDS FOR HARDWARE.

THE PERFECTION CLASS BOARD.
LUFKIN RULE CO.
CLEVELAND, O.
See Iron Age, Nov. 4th, '86. Send for Circular.

LANE'S PATENT STEEL DOOR HANGER.

The most perfect Anti-Friction Hanger in the Market, BECAUSE

It is made of steel throughout, except the wheel which has a steel axle. It will not break. It is practically free from wear. It is almost noiseless in action. It requires no oil. It has a broad bearing on the door, and keeps in line. It is by far the most durable. It may be used with any track. It is always in order.

LANE'S PATENT TRACK
Is made of steel and is easily put in position. Catches and holds no snow or ice. Door hung thereon cannot jump the track. Is not subject to decay. Requires no fitting, but is ready at once. May be used with hangers of other manufacture.

Manufactured by **LANE BROS.,** Poughkeepsie, N. Y.
JOHN H. GRAHAM & CO., General Agents, 113 Chambers Street, NEW YORK.

J. FRED. WILSON
Manufacturer of
Cold Punches, Square and Hexagon
NUTS
Washers, Chain Links, &c.
Die Making and Special Punching to Order,
23 Hermon St., Worcester, Mass.

FRUIT WINE & JELLY PRESS

SAUSAGE STUFFER

MOLASSES SELF MEASURING FAUCET

ENTERPRISE MFG. CO.
THIRD & DAUPHIN STS. PHILADELPHIA, PA.

Mrs. Potts' COLD HANDLE SAD IRONS

SELF WEIGHING CHEESE KNIFE

NO. 20 COFFEE MILL

SMOKED BEEF SHAVER

MEAT CHOPPER

BUNG HOLE BORER TOBACCO & ROOT CUTTER

AWARDED FIRST PREMIUM EVERYWHERE

20 DIFFERENT SIZES FROM \$2.75 TO \$100

SEND FOR ILLUSTRATED CATALOGUE

THE READING LOCK MANUFACTURING CO., READING, PA., U. S. A.

LOCKS OF EVERY DESCRIPTION,

AND A FULL LINE OF GENERAL BUILDERS' HARDWARE.

BROUGHTON'S
BURGLAR-PROOF SASH LOCKS.

PATENTED OCT. 7TH, 1879.



UPRIGHT KIM KNOB LOCKS, WITHOUT KNOBS.

Net per doz.

No. 308 4-inch, 2 Polished Iron Bolts, Copper
Bronzed Key, 1 tumbler, 12 changes, \$1.00

No. 311 4-inch, 2 Polished Iron Bolts, Copper
Bronzed Key, 1 tumbler, 12 changes, with stop 1.07

No. 312 4-inch, 2 Polished Iron Bolts, 1 tumbler,
12 changes, with stop, Brass Key, 1.37

No. 313 4-inch, 2 Brass Bolts and Key, 1 tumbler,
12 changes, with stop 1.79

No. 314 4-inch, 2 Polished Iron Bolts, Copper
Bronzed Key, 1 tumbler, 12 changes, with stop,
Patent Reversible Latch 1.07

No. 315 4-inch, 2 Polished Iron Bolts, Brass
Key, 1 tumbler, 12 changes, with stop, Patent
Reversible Latch 1.37

No. 316 4-inch, 2 Polished Iron Bolts, Brass
Key, 1 tumbler, 12 changes, with stop, Patent
Reversible Latch 1.37

No. 317 4-inch, 2 Polished Iron Bolts, Copper
Bronzed Key, 1 tumbler, 12 changes, with stop,
Patent Reversible Latch 1.47

No. 318 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

No. 319 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

No. 320 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

No. 321 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

No. 322 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

No. 323 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

No. 324 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

No. 325 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

No. 326 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

No. 327 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

No. 328 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

No. 329 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

No. 330 4-inch, 2 Polished Iron Bolts, Brass Key, 1 tumbler,
12 changes, with stop, Patent Reversible Latch 2.22

Special net prices to be found in Iron Age whenever changes occur.

The only manufacturers in the United States who quote bottom prices to all dealers without favoring any class.

Fine Gray Iron Castings of every description, also Real Bronze and Brass Castings, made to order: very low prices. Pattern Making, Japanning, Bronzing, Tinning, &c.

Our goods are known and liked wherever sold.

We do no underhand business, but quote alike to all for quantities less than \$1000.

Our terms are strictly 15 days, f.o.b. Reading; no charge for cases or cartage.



With these devices, Transoms may be opened and closed at will with ease and locked in position, no other fastenings are required, any one can put them on. CAUTION, look for the Trade Mark on the handles.

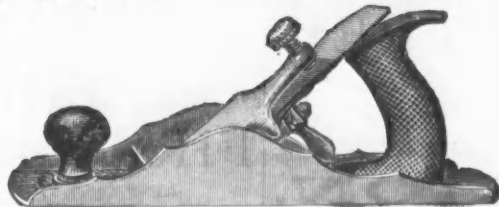
We are now prepared to fill orders for the "Crown" and "Star" Lifters, in such sizes as are listed below, which are suitable for house and office transoms, and hope soon to announce our ability to supply sizes for store transoms.

Price List "Crown" Lifters.				LIST.				Price List "Star" Lifters.			
No.	Length	Size of Rod.	Material	Price Each.	APRIL 8th	No.	Length	Size of Rod.	Material	Price Each.	
43	3 feet	1/2 x 1/4	Bronzed Iron.	\$0.55	1886.	83	3 feet	1/2 x 1/4	Bronzed Iron.	\$0.70	
44	4 "	" "	" "	0.65		84	4 "	" "	" "	0.80	
45	5 "	" "	" "	0.75		85	5 "	" "	" "	0.90	
46	6 "	" "	" "	1.75		86	6 "	" "	Nickel Plated.	2.00	
47	7 "	" "	" "	2.00		87	7 "	" "	" "	2.25	
48	8 "	" "	" "	2.35		88	8 "	" "	" "	2.50	

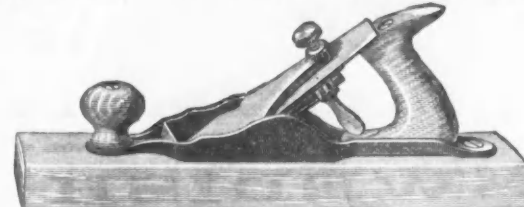
ORDER BY NUMBER.

For Sale by J. F. WOLLEY'S, Chicago, Ill.

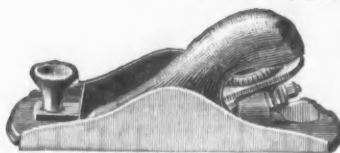
CHAPLIN'S PATENT IRON AND WOOD BOTTOM PLANES.



Jacks and Jointers.



Jack Plane.—Nos. 77, 78.



Nos. 20 and 30 Blocks.

These planes (with a smooth face) have been in the market for many years, obtaining a steadily increasing trade as they have become known. We claim for them the utmost simplicity of construction, prompt adjustment and superior beauty of style and finish.

The clamp plate and lever are nickel-plated; the handle is of checkered rubber, which is stronger than any wood handle, and affords an easy, firm grip—also made with nickel iron handle.



Smooth Plane, Corrugated Bottom.

This Cut shows the surface of our new Corrugated Iron Planes. The corrugations afford ample air spaces, and reduce the traction and friction to the minimum. Same price as smooth face.

OUR NEW WOOD BOTTOM PLANES.

The Clamping Plate and Lever are nickel-plated; the Beechwood has been thoroughly seasoned and is a thicker block than usual, though the Plane is no heavier than those already in the market.

Corrugated face.	Smooth face.
No. 202, Iron Smooth Plane, 7x1 1/4 in. Cutter..... \$8.60	No. 211, Iron Joiner Plane, 24x3 1/2 in. Cutter..... \$0.75
No. 203, Do., do., 8x1 1/4 in. do..... 3.52	No. 212, Iron Smooth Plane, 8x1 1/4 in. Cutter..... 3.75
No. 204, Do., do., 9x1 1/4 in. do..... 3.58	No. 213, Iron Smooth Plane, 9x1 1/4 in. Cutter..... 3.75
No. 205, Do., do., 10x1 1/4 in. do..... 3.50	No. 214, Iron Smooth Plane, 10x1 1/4 in. Cutter..... 3.75
No. 206, Do., do., 11x1 1/4 in. do..... 3.85	No. 215, Iron Smooth Plane, 11x1 1/4 in. Cutter..... 3.75
No. 207, Do., do., 12x1 1/4 in. do..... 4.25	No. 216, Iron Smooth Plane, 12x1 1/4 in. Cutter..... 3.75
No. 208, Do., do., 13x1 1/4 in. do..... 5.00	No. 217, Iron Smooth Plane, 13x1 1/4 in. Cutter..... 3.75
No. 209, Do., do., 14x1 1/4 in. do..... 5.00	No. 218, Iron Smooth Plane, 14x1 1/4 in. Cutter..... 3.75
No. 210, Do., do., 15x1 1/4 in. do..... 5.75	No. 219, Iron Smooth Plane, 15x1 1/4 in. Cutter..... 3.75

Corrugated face.	Smooth face.
No. 211, Iron Joiner Plane, 24x3 1/2 in. Cutter..... \$0.75	No. 212, Iron Smooth Plane, 8x1 1/4 in. Cutter..... 3.75
No. 213, Iron Smooth Plane, 9x1 1/4 in. Cutter..... 3.75	No. 214, Iron Smooth Plane, 10x1 1/4 in. Cutter..... 3.75
No. 215, Iron Smooth Plane, 11x1 1/4 in. Cutter..... 3.75	No. 216, Iron Smooth Plane, 12x1 1/4 in. Cutter..... 3.75
No. 217, Iron Smooth Plane, 13x1 1/4 in. Cutter..... 3.75	No. 218, Iron Smooth Plane, 14x1 1/4 in. Cutter..... 3.75
No. 219, Iron Smooth Plane, 15x1 1/4 in. Cutter..... 3.75	No. 220, Iron Smooth Plane, 16x1 1/4 in. Cutter..... 3.75

The Adjustable Mouth Smooth Plane is a new feature, and meets with a great deal of favor.

FOR SALE BY THE HARDWARE TRADE.

TOWER & LYON, MANUFACTURERS, 95 CHAMBERS STREET, NEW YORK.

THE FOLLOWING JOBBERS CARRY A GOOD ASSORTMENT

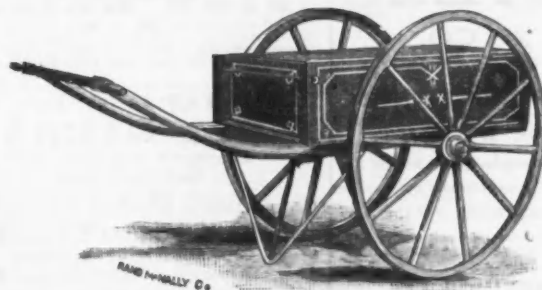
RIGELOW & DOWSE, Boston.
WALBRIDGE & CO., Buffalo.
LINDSAY, STERNIT & CO., Pittsburgh.
LOGAN, GREGG & CO., Pittsburgh.
KRUSE & BAHLMANN, Cincinnati.
A. F. SHAPLEIGH & CANTWELL HDW. CO., St. Louis.

WITTE HDW. CO., St. Louis.
A. F. SEESEBERGER & CO., Chicago.
EDWIN HUNT'S SONS, Chicago.
BUHL, SONS & CO., Detroit.
BLACK HARDWARE CO., Detroit.
WM. FRANKFURTH HDW. CO., Milwaukee.
McINTOSH, HUNTINGTON & CO., Cleveland.

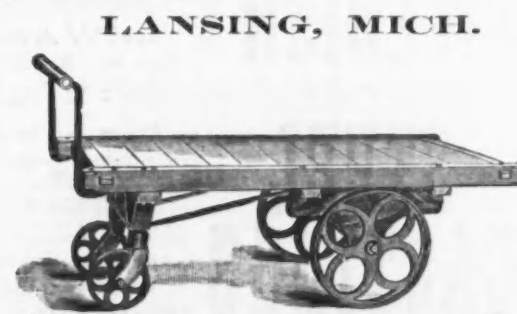
FARWELL, OZMUN KIRK & CO., St. Paul.
BLISH, MIZE & SILLIMAN, Atchison.
PARK, CRANER & CO., Leavenworth.
FROTHINGHAM & WORKMAN, Montreal, Can.
CAVERHILL, LEARMONT & CO., Montreal, Can.
WM. THOMSON & CO., Toronto, Can.
WOOD & LEGGAT, Hamilton, Can.

LANSING WHEELBARROW CO.,

LANSING, MICH.



HAND CART.



THE REYNOLDS IMPROVED TRUCK.

Front Wheels Casters. Truck turns in its own length. Runs on or off elevator or scales at any angle. Is easily dumped by lifting handle. Any size. Send for circular.



Globe Patent Garden Barrow.



Capital Patent Bolted Barrow.

Send for Catalogue.

St. Louis Stamping Co.,

ST. LOUIS, MO.,

MANUFACTURERS



BRANCH HOUSES, NEW YORK, CHICAGO.

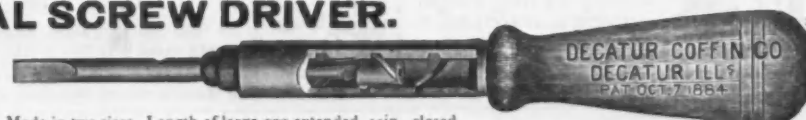
GRANITE IRONWARE

AND DRIPPING PANS,

Fine Black Sheet and Galvanized Iron.

THE EUREKA SPIRAL SCREW DRIVER.

By pushing on the end of handle it will drive a screw in 1/2 of the time of the old method. Sold by C. E. Jennings & Co. N. Y.; Hibbard, Spencer, Bartlett & Co., Chicago; Simmons Hardware Co. St. Louis; Walbridge & Co. Buffalo, N. Y.; Carlin & Fulton, Baltimore, Md.; Burdett & Williams, Boston; Biddle Hardware Co. Philadelphia; A. Freeman, Chicago, and all the principal Hardware Dealers throughout the world.



Made in two sizes. Length of large one extended, 19 in. closed 12 in. small one opened 14 in. closed 9 in. Blade 1-4 and 5-16 in.

Owned and Manufactured by DECATUR COFFIN CO., Decatur, Ill.

No. 1 \$1.25 No. 2 \$1.50

S. R. READING,
Commission Iron Merchant,
and General Agent for The

"Key Stone" Steel & Iron Nail.

Manufactured by

Ellis & Lessig Steel and Iron Co.

(LIMITED),

POTTSTOWN, PA.

New England Office and Store,

No. 20 Pearl St., Boston, Mass.

"THE KITCHEN KING,"



The king of all can openers will open any size or shape can—round, oblong, or square—directly below the rim (or top). This is the only can opener on the market that will accomplish its work freely, gracefully and with the greatest of ease, and is the cheapest tool in the world at 15 Cents. It is a well-made tool, finely polished; has a hard wooden handle, forged steel tempered knife and lance, and is in every respect a first-class tool, and in fact it has no equal.

PATENT APPLIED FOR.

Trade supplied at liberal discounts by
HISCOX FILE MAN'G CO.,
MANUFACTURERS' AGENTS,
West Chelmsford, Mass.

HP NAIL CO., CLEVELAND, O.

STANDARD PENNY NAILS.

BRADS OR FINISHING NAILS. CAR NAILS. CIGAR BOX NAILS. TIN AND SLATE ROOFING NAILS. WIRE SPIKES FOR TRACK AND DOCK WORK. WIRE TACKS. BLIND AND BED STAPLES AND LINKS. MCGREGOR NAIL BOXES, AND WIRE NAILS OF ALL KINDS, BARBED OR SMOOTH, PLAIN, TINNED OR GALVANIZED.

AGENTS: C. McCARTY & CO., New York. J. WALES & CO., Boston. HEATON & DENCKLA HARDWARE CO., Philadelphia. HIBBARD, SPENCER BARTLETT & CO., Chicago. BEALS & BROWN, Buffalo. C. B. MELISH, Cincinnati, Ohio. HUNTINGTON, HOPKINS & CO., San Francisco. JNO. PRITZLAFF HARDWARE CO., Milwaukee.



THIS VALVE

is expanded by winding a strip of leather around the link under the rubber. The link and rubber are so constructed that the packing cannot get out.

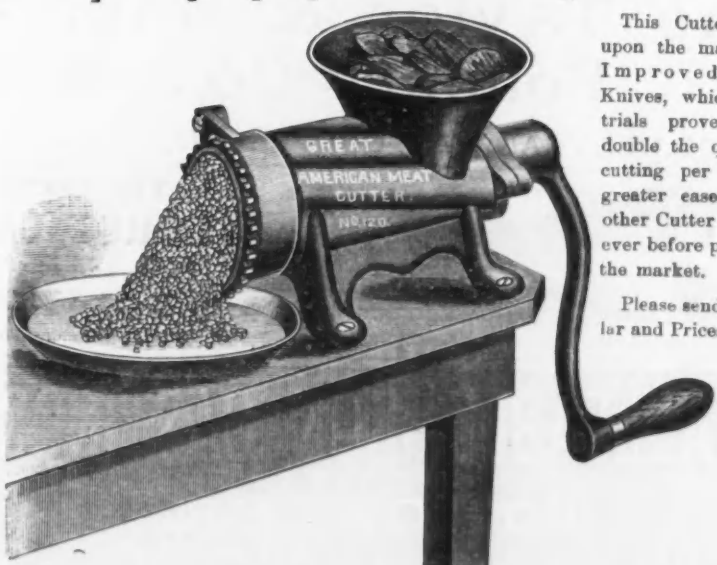
A. WYCKOFF & SON,
ELMIRA, N. Y.

PATENT RUBBER VALVE FOR CHAIN PUMPS.

The BEST and Most Durable Expanding Valve on the Market

Write for Sample and Prices.

GREAT AMERICAN MEAT CUTTER.



This Cutter is now upon the market with Improved Cutter Knives, which various trials prove will do double the quantity of cutting per hour with greater ease than any other Cutter or Chopper ever before placed upon the market.

Please send for Circular and Prices.

AMERICAN MFG. CO.,
22nd and Washington Aves., Philadelphia.

Agents, LLOYD & SUPPLEE HDW. CO., 503 Market St., and 4 & 6 N. 5th, Phila.

FORSTER'S STONE AND IRON ORE BREAKER

VERY SIMPLE AND VERY DURABLE. For Mining, Blast Furnaces, Iron and Steel Works, Railroad Ballast, and Macadam.

Patented April, 1873.



View when Ready for Work.

TOTTEN & CO. Machinery Foundry, PITTSBURGH, PA.



A TAKING NOVELTY. "Beacon Hill" MOUSE TRAP



Always Baited. Sure to Catch.

SEND 10 CENTS FOR SAMPLE.

RIPLEY MFG. CO.,
UNIONVILLE CONN. U. S. A.

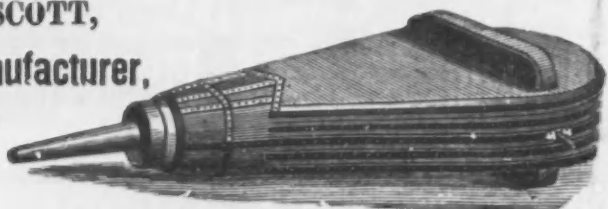
GEO. M. SCOTT,

Bellows Manufacturer,

Johnson Street

Cor. 22d St.,

CHICAGO, ILL.



EXPANDING TAPS

From 3-4 in. to 10 in. Wrought-Iron Pipe Size.

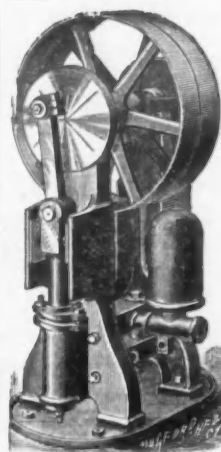
SEND FOR PRICES.

WORSWICK MFG. CO.
CLEVELAND, O.,
Manufacturers of

Malleable and Cast Iron Fittings and Brass Goods.

Jobbers of Plumbers', Gas and Steam Fitters' Tools and Supplies.

Agents for IRON PIPE AND BOILER TUBES
SEND FOR CATALOGUE.



BOILER AND TANK FEED POWER PUMP,

Manufactured by

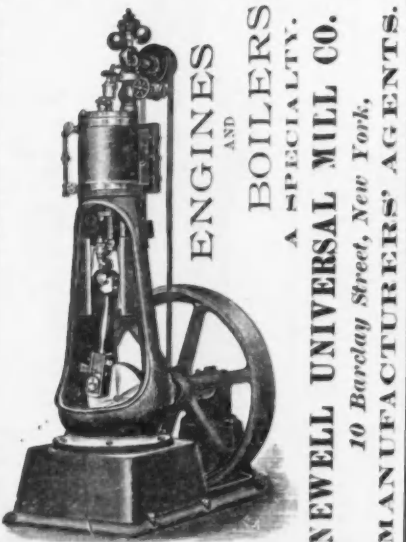
The Shepard

Manufacturing Co.

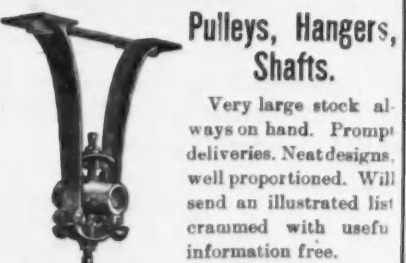
UNION CITY,

Connecticut.

Agents: A. ALLER, 109 Liberty St., N. Y. JARVIS ENGINEERING CO., 61 Oliver Street, Boston.



NEWELL UNIVERSAL MILL CO.
A SPECIALTY.
10 Barclay Street, New York.
MANUFACTURERS' AGENTS.



Pulleys, Hangers, Shafts.

Very large stock always on hand. Prompt deliveries. Neat designs, well proportioned. Will send an illustrated list crammed with useful information free.

P. Prybil, 467 W. 40th St., N. Y.

Brass and Wood-Working Machines.

CHAMPION IRON FENCE CO.,
KENTON, OHIO.

Largest Iron Fence and Railing Works in U. S.



SPECIALTIES—Iron Stairs and Jail Work. Builders' and Ornamental Iron Work, and the only manufacturers of Malleable Iron Castings, guaranteed against breakage; also manufacturers of the Celebrated Ohio Champion Iron Fence and Lift Pumps. Send for 100-page Catalogue.

THE BEST AND CHEAPEST

WIRE NAIL MACHINE,

Tack and Nail Machinery.

Chas. A. SWEETSER, Brockton, Mass. (39 Montello Street.)

ALMOND DRILL CHUCK

Sold at all Machinists' Supply Stores.

T. R. ALMOND

83 & 85 Washington St.,
BROOKLYN, N. Y.



THOMAS WOOD & CO.

Twenty-second and Wood Streets, Philadelphia, Pa

Shafting, Gearing, Self-Oiling Bearings, Friction Pulleys, Elevators.

Looms, Cotton and Woolen Machinery for Winding, Spooling, Reeling, Beaming, Warping, Dyeing, Sizing, Scouring, &c.

ILLINOIS IRON & BOLT CO.,

Nos. 20 to 26 Main Street,

CARPENTERSVILLE, KANE CO., ILL.

MANUFACTURERS OF

Blacksmiths' Tools,



Thimble Screws,

LOCOMOTIVE JACK SCREWS

Track Jacks, Carriage Makers' Vises,

SAD IRONS, COPYING PRESSES AND STANDS, &c.

BUFFALO HAMMER COMPANY, Buffalo, N. Y., U.S.A.,

Manufacturers of a full line of

Solid Cast Steel Hammers, Sledges, Mauls,

R. R. TRACK TOOLS, &c.



Every Hammer or Tool having our name is fully warranted. Catalogues and discount sent on application. Export orders will receive prompt and careful attention.



Office of A. A. GRIFFING IRON CO.,
Sole Manufacturers of Bundy Radiators,
JERSEY CITY, N. J., May 11, 1887.

Mr. Wm. J. LADD,

Dear Sir:—You are entitled to an expression of our opinion in reference to the usefulness of your Discount Book. We beg to say that we have used it a great deal and are more than pleased with it, as it proves an accurate and speedy assistance in computing discounts. It certainly saves much time which otherwise would be lost in figuring, and therefore we do cheerfully recommend the book and believe it should have a place in the office of every man doing even a fair amount of business. The price you ask, \$3.00 per volume, is no criterion of its worth, and we are free to say that if we could not obtain another copy we would not part with the one we have for many times the amount paid for it. Wishing you every success in the sale of your creditable work, we remain,
Very respectfully yours,
THOS. H. WILLIAMS, President.

A practical means for rapidly reaching absolutely accurate results without the mental wear of computing. Everybody dealing with percentage should use it. It contains about 120 thousand computations indexed for ready reference, arranged in a convenient form for practical use. It gives at a glance the net of any sum at a great range of discounts, both simple and complex, and it will save you time, money and brain.

PRICE, THREE DOLLARS.

Sent post-paid upon receipt of price, by

DAVID WILLIAMS, 66 & 68 DUANE ST., NEW YORK.

IRON LEVELS



C. F. RICHARDSON, Manufacturer, ATHOL, MASS.

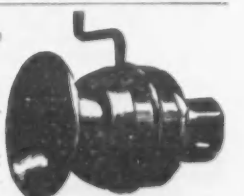
W. R. OSTRANDER & CO.,

21, 23 & 25 ANN STREET, NEW YORK.

Manufacturers of

SPEAKING TUBES, WHISTLES, ORAL, ELECTRIC, MECHANICAL & PNEUMATIC ANNUNCIATORS & BELLS.

Complete Outfits of Speaking Tubes, Whistles, Electric, Mechanical and Pneumatic Bells. A full line always in stock. Send for new catalogue. Factory, Dekalb ave., near Knickerbocker, Brooklyn, N. Y.



Dean Bros.' Steam Pump Works
INDIANAPOLIS, IND.



DUPLIX PUMP. PUMPING MACHINERY FOR ALL PURPOSES. SINGLE. SEND FOR CATALOGUE AND PRICES.



Issues Policies of Insurance after a careful Inspection of the Boilers.
COVERING ALL LOSS OR DAMAGE TO
BOILERS, BUILDINGS and MACHINERY,
ALSO COVERING LOSS OF LIFE AND INJURY TO PERSONS
ARISING FROM
STEAM BOILER EXPLOSIONS.

Full information concerning the plan of the Company's operations can be obtained at the
COMPANY'S OFFICE, HARTFORD, CONN.,
or at any agency.

ALLEN Pres.

W. B. FRANKLIN, Vice-Pres.

J. B. PIERCE, Sec.

BOARD OF DIRECTORS:

M. ALLEN, President.
LUCIUS J. HENDER, President Aetna Fire Ins. Co.
FRANK W. CHENEY, of Cheney Bros., Silk Manuf.,
Hartford and New York.
CHARLES M. BEACH, of Beach & Company.
DANIEL PHILLIPS, of Adams Express Company.
EDMUND A. STEDMAN, Treasurer, Fidelity Co.,
Hartford.
EDWARD W. H. JARVIS, President Colt's Pat. Fire
Arms Manufacturing Co.
THOMAS O. ENDERS, of the Aetna Life Insurance Co.

LEVERETT BRAINARD, of the Case, Lockwood &
Bainard Co.
GEN. WM. B. FRANKLIN, Vice-President Colt's Pat.
Fire Arms Mfg. Co.
CLAPP SPOONER, N. E. Manager Adams Express
Co., Bridgeport, Ct.
NEWTON CASE, of the Case, Lockwood & Bainard Co.
NELSON HOLLISTER, of the State Bank, Hartford.
CHAS. T. FAIRY, of Baldwin Locomotive Works,
Philadelphia.
HON. HENRY C. ROBINSON, Attorney at Law, Hart-
ford.

ALWAYS RELIABLE. —THE— NEVER FAIL.

IMPROVED Anthony Wayne Washer.



This is the only Washer that will give entire satisfaction; it works easy, washes clean, does not tear the clothes and is the general favorite in every household. It is sold upon its merits. We solicit the correspondence of the trade. For prices, terms, &c., address
THE
Anthony Wayne Mfg. Co.,
FORT WAYNE, IND.

INTERIOR VIEW OF WASHER. EXTERIOR VIEW OF WASHER.

Russell & Co.
MASSILLON, OHIO,
BUILDERS OF
AUTOMATIC ENGINES
BOILERS, ETC.
Complete Power Plants Furnished and Erected.
SEND FOR CATALOGUE.



NEW CHAMPION FORCE PUMP
HAS
Vacuum Chamber and Air Chamber,

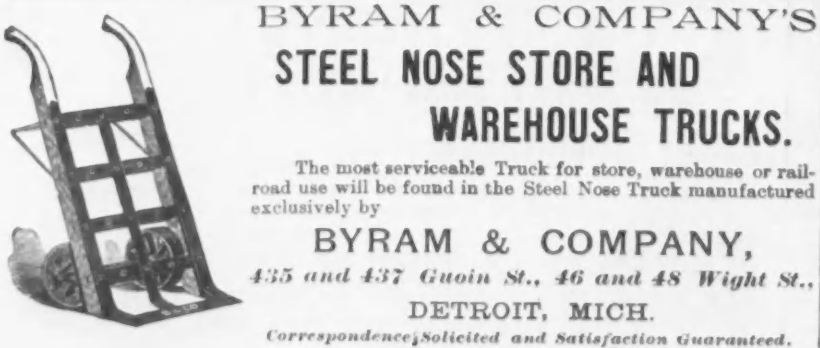


Producing a continuous flow of water, both in suction and discharge. Works smoother and easier than any other force pump in the market. Has Seamless Drawn Brass Cylinders and no stuffing boxes. Never freezes in winter, and is not liable to get out of order. With Hose Attachment it is valuable as a fire protection, and for sprinkling lawns, gardens, &c. It is specially adapted for all kinds of wells—dug, drilled or driven—and for pumping water long distances from springs.

CLARK'S IMPROVED Ratchet Stocks, Dies & Pipe Vises
FOR USE BY
Plumbers, Gas Fitters and Pump Dealers.

With the Ratchet Stock pipe can be threaded in a corner, down in wells, or in positions that would be inaccessible with other tools.
Send for Circulars and Price Lists to
CLARK BROTHERS, Mfrs., Belmont, N. Y. U. S. A.

BYRAM & COMPANY'S STEEL NOSE STORE AND WAREHOUSE TRUCKS.



The most serviceable Truck for store, warehouse or railroad use will be found in the Steel Nose Truck manufactured exclusively by
BYRAM & COMPANY,
435 and 437 Guoin St., 46 and 48 Wight St.,
DETROIT, MICH.
Correspondence Solicited and Satisfaction Guaranteed.

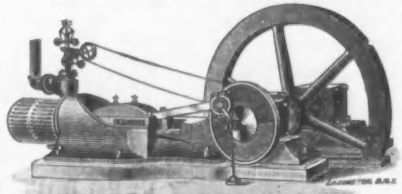
DENISONS' PATENT
Suspended Weighing Machine.
No Springs. No Liquids.



No Uncertainty. No Loose Weights
The only accurate Crane Weighing Machine ever produced

for weighing goods of all kinds during removal from Ships, Canal Boats, Railway Trucks, Warehouses, and also in Iron and Steel Furnaces, as the machines are not liable to injury from the heat. CONSTRUCTED upon the compound lever principle, OF THE BEST FORGED IRON AND STEEL. All the knife edgings and bearings are steel, scientifically tempered and hardened.

McCOY & SANDERS,
26 Warren Street, N. Y.



PORTER-HAMILTON, ROLLING MILL ENGINE.

Hamilton Blowing Engine
FOR BLAST FURNACES.

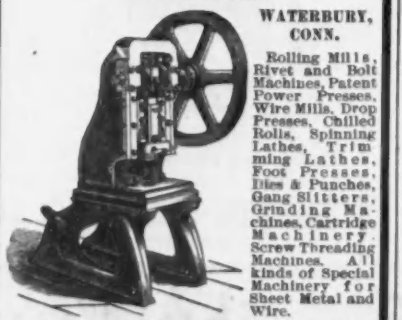
MOST SATISFACTORY IN USE.
Send for Catalogue.

WILLIAM TOD & CO.,
YOUNGSTOWN, OHIO.

Upright Power Hammer.



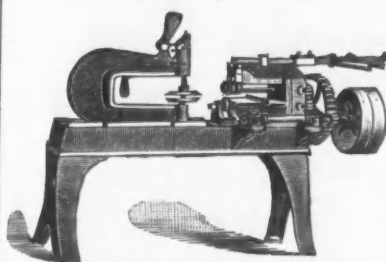
The Waterbury Farrel Foundry and Machine Co.,
MANUFACTURERS.



Drop Forge Company,
IRON and STEEL DROP FORGINGS,
1229 Callowhill Street,
PHILADELPHIA, PA.

S. CHENEY & SON,
GRAY IRON CASTINGS
MANLIUS, N. Y.

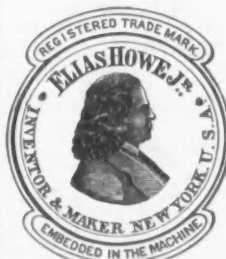
NIAGARA STAMPING AND TOOL CO.,
MANUFACTURERS OF
Machinery for Shearing Metal in all its Various Forms.
POWER SQUARING AND CIRCLE SHEARS,



POWER SLITTING SHEARS
Power Chopping Shears,
For Tack and Nail Plates, and for
Cutting Steel for Cutlery Works.

OFFICE AND WORKS:
Superior, corner Randall Streets
BUFFALO, N. Y.

Power Circle and Slitting Shears No. 204.
Send for our complete Illustrated Catalogue and Price List, and mention this paper.



THE NEW HOWE MFG. CO.,
BRIDGEPORT, CONN.,
Manufacturers of

SEWING MACHINES,

LIGHT AND MEDIUM WEIGHT

GRAY IRON CASTINGS

OF ALL DESCRIPTIONS TO ORDER.

Also Tool Making, Japanning and Plating.

CORRESPONDENCE SOLICITED.

LIGHT GRAY IRON CASTINGS
IS OUR SPECIALTY.

WE HAVE VERY GREAT CAPACITY, QUALITY EXCEPTIONAL

We have, in connection with our Foundries, machine shop for all kinds of light work.

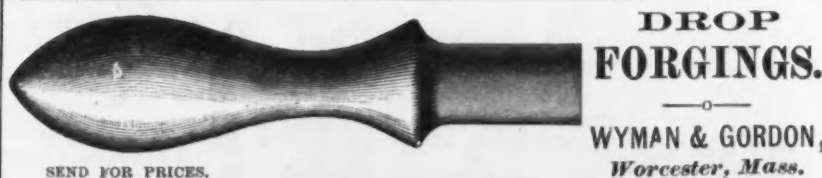
Also Japanning and Nickel-Plating Works of our own.

CORRESPONDENCE SOLICITED.

The Taylor & Boggis Foundry Co.,

65 CENTRAL WAY, CLEVELAND, OHIO.

DROP FORGINGS.
WYMAN & GORDON,
Worcester, Mass.



SEND FOR PRICES.

MALLEABLE IRON CASTINGS
TO ORDER.
NORTHWESTERN MALLEABLE IRON CO.
MILWAUKEE, WIS.

Waterbury Malleable Iron Co.,
WATERBURY, CONN.,
—MANUFACTURERS OF—
Cast and Malleable Iron Fittings,
For Steam, Gas, Water and Oil.
Refined Malleable and Gray Iron
CASTINGS TO ORDER.

NEW YORK: Cor. Gold and Platt Sts. SAN FRANCISCO: 20 California St.

THE WILMOT & HOBBS MFG. CO.
COLD ROLLED STEEL
FOR PRESS & DROP WORK
LONG COILS SUITABLE FOR FEEDING
AUTOMATIC MACHINES
METALLIC GOODS
MADE TO ORDER
BRIDGEPORT, CONN. U. S. A.

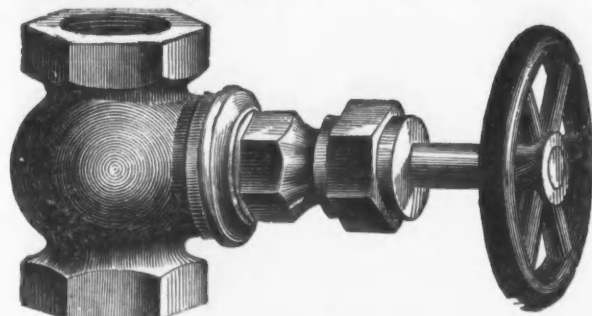


SMALL GRAY IRON CASTINGS.
HAIGHT & CLARK,
Iron Founders, Albany, N. Y.,
MANUFACTURERS OF
ORNAMENTAL AND ART CASTINGS, ROSETTES AND PICKETS FOR WIRE WORKERS
Bases and Boots for Wire Forms, Piano and Organ Castings, Machinery Castings, Stove Patterns taken from the Wood. Correspondence invited for all kinds of Castings. Japanning, Nickel-Plating, Bronzing, or all their Branches.
Send for Wire Workers Catalogue



Soft Castings for Electrical Work and Sewing Machines. Fine light Gray Iron Castings of all kinds. CLEVELAND, OHIO.

McNab & Harlin Mfg. Co., MANUFACTURERS OF BRASS COCKS AND VALVES



For Steam,
Water,
and Gas.

WROUGHT IRON
PIPE & FITTINGS

Plumbers'
Materials.

Factory: Paterson, N. J.

56 John Street, N. Y.

Our new Illustrated Catalogue and Price List is now ready, and will be sent to the Trade with their first order, or by express, if desired, before ordering.



WM. H. HASKELL, President.

E. S. MASON, Treasurer.

D. A. HUNT, Agent.

WM. H. HASKELL CO., MANUFACTURERS OF

GIMLET POINT

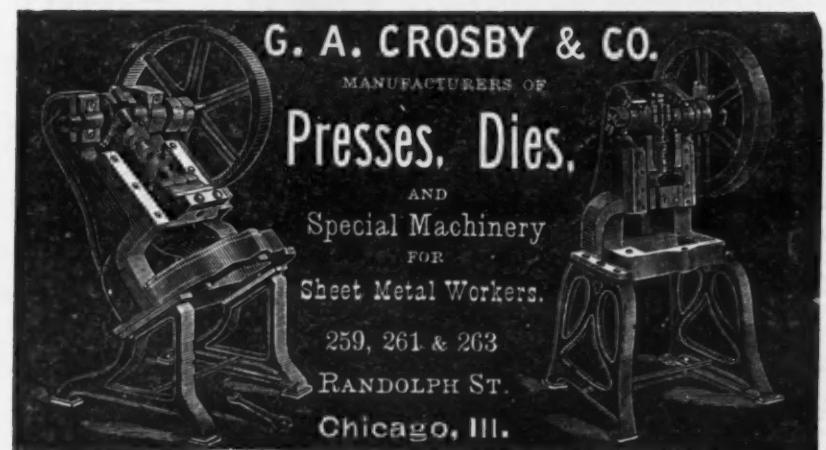
COACH SCREWS



Bolts, Cold-Punched Nuts & Washers,
SUITABLE FOR MACHINERY OF ALL KINDS.

Office and Works: 277 Main St., PAWTUCKET, R. I., U. S. A.

HENRY B. NEWHALL CO., Agents,
105 Chambers St., New York. 47 Pearl St., Boston.



G. A. CROSBY & CO.

MANUFACTURERS OF

Presses, Dies,

AND
Special Machinery
FOR
Sheet Metal Workers.

259, 261 & 263

RANDOLPH ST.

Chicago, Ill.

THE D. E. WHITON MACHINE CO., MANUFACTURERS OF

Gear Cutters, Centering Machines,
Lathe and Drill

CHUCKS

& Co., & Co.,

59 HOWARD STREET,

NEW LONDON, CONN.

Sole European Agents,

SELIG SONNENTHAL & CO., LONDON

Send or Prices



Malmedie & Hiby,

DUSSELDORF-OBEBILK (Germany),

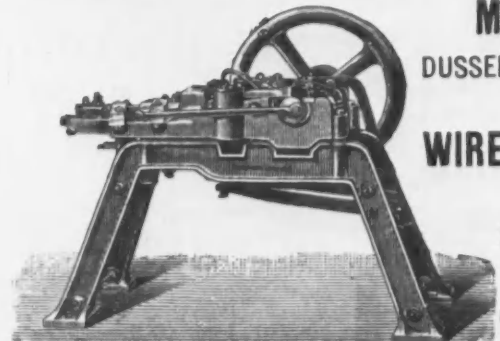
MANUFACTURERS OF

WIRE NAIL MACHINES.

L. HERNSHEIM,

16 and 18 Exchange Place, New York,

Sole Agent for the United States and Canada.



LIDGERWOOD'S HOISTING ENGINES,

ALSO

IMPROVED BOILERS,

SPECIALY ADAPTED FOR

GENERAL MANUFACTURING

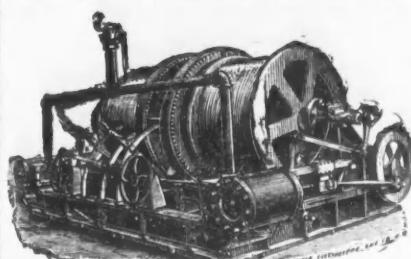
AND MINING PURPOSES,

Contractors, Electric Lighting, Pile Driving

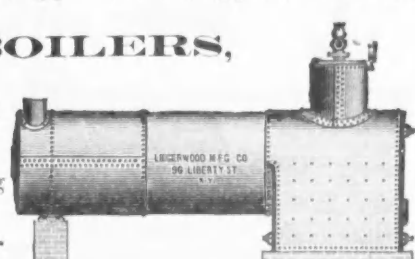
Dock Building, Excavating, &c.

300 STYLES AND SIZES.

NEW CATALOGUES NOW READY.



DOUBLE DRUM FRICTION MINE HOIST.



SUPERIOR BOILER.

LIDGERWOOD MFG. CO., 96 Liberty Street, New York.
WORKS, BROOKLYN, N. Y.

ADAMANTINE SHOES, AND DIES FOR STAMP MILLS.

Recent improvements in material used and manner of casting have resulted in producing an article that will outwear from three to six of the ordinary iron goods. Also a Shoe and Die that will not "cup" or break at the shank. SEND FOR ILLUSTRATED CIRCULAR. When ordering, send rough sketch, with dimensions.

S. H. KOHN, President.

C. P. HAUGHLIN, Vice-President.

CHROME STEEL WORKS,

BROOKLYN, N. Y.



STAMP SHOES.



STAMP SHOES.

THE SCIENTIFIC BLACKSMITHS' HAND BLOWER, ALL IRON.

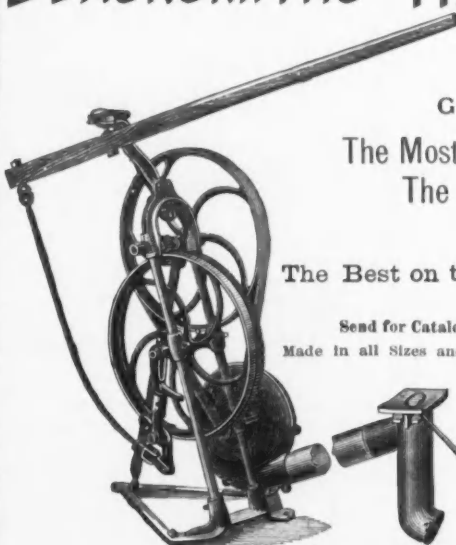
GUARANTEED

The Most Compact,
The Lightest Running,
The Strongest Blast.

The Best on the Market, and is Practically
Noiseless.

Send for Catalogue of these and our Portable Forges.

Made in all Sizes and Styles, and Guaranteed in every Respect.



THE

FOOS MANUFACTURING CO.,

SPRINGFIELD, OHIO.

GRAY IRON AND BRASS CASTINGS

We have unexcelled facilities for producing fine Castings and Finished Work, Japanning, Plating, Annealing and Kindred Branches, Pattern Making and Light Machine-Work.

Those in need of Castings are invited to send Drawings or Samples for Estimate, or, better, a trial order on which we will make a satisfactory price. Correspondence Solicited.

I. S. SPENCER'S SONS,
QUILFORD, CONN.

AND LIGHT MANUFACTURING.

RICHARD DUDGEON,

No. 24 Columbia Street, New York.

Maker and Patentee of the Improved

Hydraulic Jacks
AND
Punches.

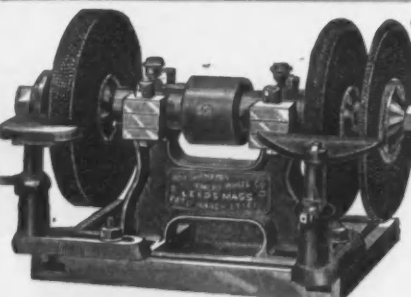


Roller Tube Expanders and Direct-Acting Steam Hammers.

Communications by letter will receive prompt attention.
Jacks for pressing on Car Wheels or Crank Pins made to order.

BOILERS

MAHONING BOILER WORKS
ESTABLISHED 1863.
PIPES, STACKS, BEAMS, ROOF TRUSSES
BLAST FURNACES & ROLLING MILL WORK.
W.B. POLLOCK & CO. YOUNGSTOWN, OHIO.



ESTABLISHED 1867.

CAPITAL \$100,000.

Northampton Emery Wheel Co.,
LEEDS, MASS.

And 20 South Canal St., Chicago.

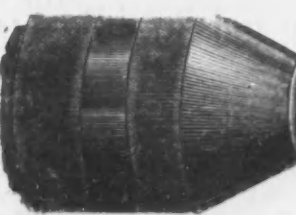
MANUFACTURERS OF

EMERY WHEELS

EMERY WHEEL MACHINERY
Of Best Quality.

Send for Catalogue.

FACTORY AT LEEDS, MASS



THE NEW GIANT DRILL CHUCK.

Holds a Drill With the Grip of a Giant. All Steel.

Parts interchangeable.

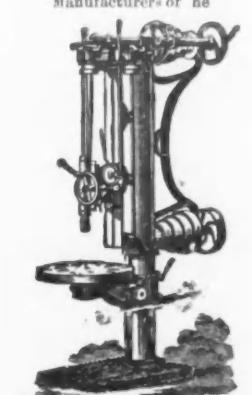
SIMPLE IN CON-
STRUCTION.

EASY TO TAKE APART AND CLEAN. BEST OF WORKMAN-
SHIP AND VERY CHEAP. Manufactured and sold by

THE SMITH & EGGE MFG. CO., Bridgeport Conn.

P. BLAISDELL & CO.

Worcester, Mass.,
Manufacturers of



BLAISDELL'S UPRIGHT DRILLS AND OTHER FIRST-CLASS MACHINIST TOOLS.

Send for new
Catalogue
of
Specialties.



ALFRED BOX & CO.

312 314, 316 Green St.,
PHILADELPHIA, PA.

Manufacturers of

Box's Pat. Double

Screw Hoists.

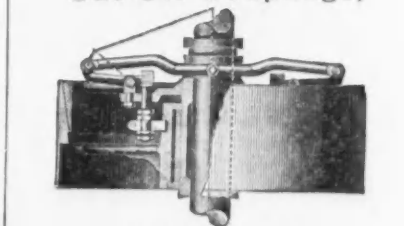
13,000 in use.

Many have done hard
continuous duty 5 years
without a single part
being renewed. This is the
key of our success. They
have built up a reputation
themselves that cannot be
approached. Our improved

Radial Drills

are also assuming the same
standard.

Pat. Friction Pulleys and
Cut-Off Couplings,



MANUFACTURED BY
Sandy Hill Iron & Brass Works
SANDY HILL, N. Y.

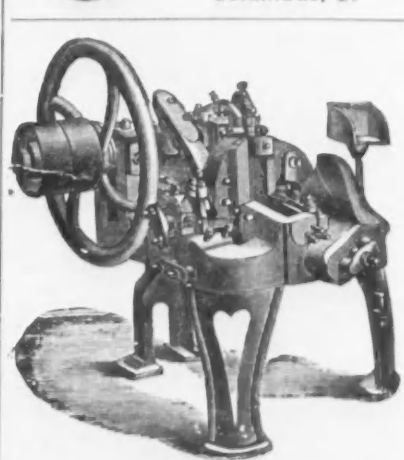


THE CHAMPION

The best general purpose
Carriage Bolt for the
money in the world.

Write for our new Illus-
trated Catalogue, em-
bracing our full line of
Bolts, Axle, Spring-bar and
Saddle Clips, Shaft Cou-
plings, Pole Eyes, King Bolts,
Nuts and Carriage For-
gings.

Columbus Bolt Works,
Columbus, O.



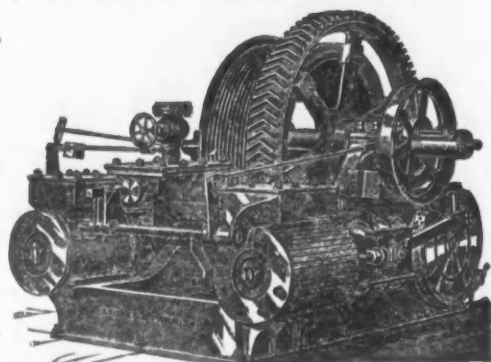
PITTSBURGH MFG. CO.

Manufacturers of Nail and Spike Machines,
Nail Washers, Rivets, &c. Castings, Forgings and
Blacksmith Work promptly attended to.
Office and Works: Railroad St. near 28th Pittsburgh, Pa.

STOKES & PARRISH MACHINE CO., Philadelphia.

ELEVATORS,

Passenger and
Freight, Steam,
Hydraulic and
Belt Power.

HOISTING
MACHINERY

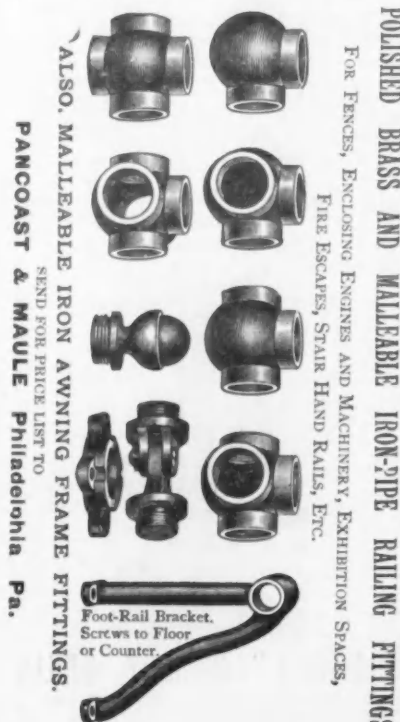
For Mines, Dock
Use and Inclined
Planes.
All kinds of
Hoisting Machin-
ery a Specialty.

BLAST FURNACE HOISTING ENGINES,

With Vertical or Horizontal Cylinders for Handling Stock to Top of Stack
with One or Two Platforms.

Works and Office, 3001 CHESTNUT STREET, PHILA.

New York Office, 95 and 97 LIBERTY STREET.



POLISHED BRASS AND MALLEABLE IRON-PIPE RAILING FITTINGS
FOR FENCES, ENCLOSING ENGINES AND MACHINERY, EXHIBITION SPACES,
FIRE ESCAPES, STAIR HAND RAILS, ETC.

IMPROVED
Steam Glue Heaters,

For Pattern Makers, Cabinet Makers, Joiners,
Bookbinders, Car Builders, &c. Has no
Joints to leak, and is furnished with
Enameled Iron Pots which
will not discolor Glue
or Paste.

For Price-List of fifteen different sizes, address

PANCOAST & MAULE,
PHILADELPHIA.

B. F. STURTEVANT'S
IMPROVED
PORTABLE FORGES,
NEW DESIGNS

STRENGTH, CAPACITY, CONVENIENCE AND
DURABILITY COMBINED.

ADAPTED TO ALL KINDS AND CLASSES OF WORK.

Sold for 25 per cent. less money than any other
Forge of equal capacity and merit.

BUY NO OTHER.

B. F. STURTEVANT,
BOSTON, MASS.

WORKS: at Jamaica Plain.

SALESROOM: 115 Purchase Street, Boston, Mass.

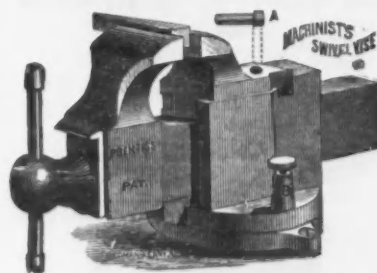
WALKER MFG. CO.

SHAFTING,
HANGERS,
PULLEYS.

Pulley Castings and
Machine-Molded
GEARING
A SPECIALTY.

Cleveland, - Ohio.

Estimates furnished. Write for
Gear and Price Lists A.



PRENTISS' PATENT VISES,

ADJUSTABLE JAW,

Stationary or Pat. Swivel Bottoms,

Adapted to all kinds of Vise Work, also

"PEEL-LESS" SWIVEL PIPE GRIP,

FITS ANY VISE. SOLD BY THE TRADE.

PRENTISS VISE CO.,

23 Dey St., New York,

SOLE PROPRIETORS. SEND FOR CIRCULAR.



BUTTERFIELD & CO.,

MANUFACTURERS,

Derby Line, Vt.

Send for Discounts.

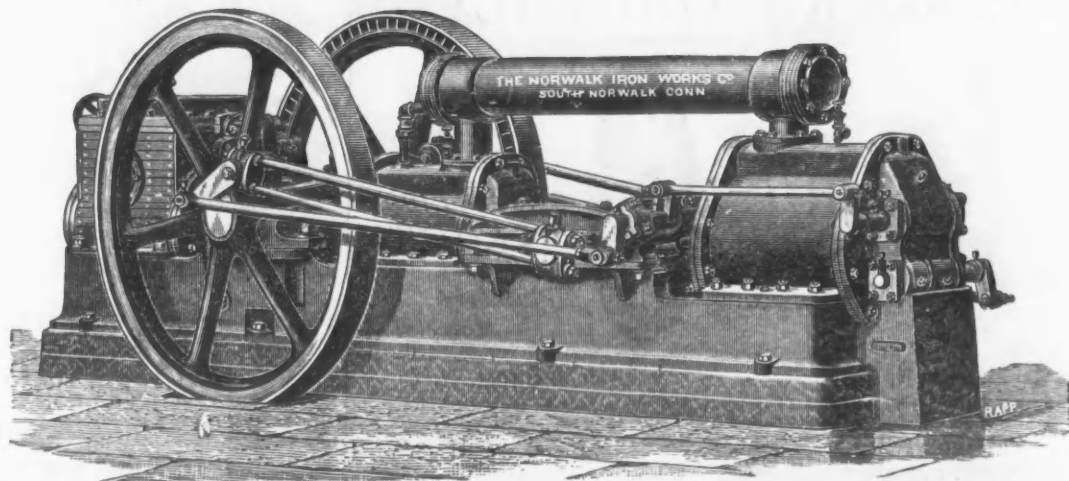
FERRACUTE MACHINE CO.,

BRIDGETON, NEW JERSEY, U. S. A.,

Presses, Dies AND ALL Sheet Metal Tools.

Send for Illustrated Catalogue with sizes, weights and prices
of 100 different kinds of Presses and Tools for
Cans, Tinware, Silver and Brass Goods, Locks, Hardware
and other Iron Goods. A new line of Punching Presses just out.

Air Compressors.



THE NORWALK IRON WORKS CO., South Norwalk, Conn.

THE STANDARD TOOL CO.,

CLEVELAND, OHIO,

Manufacturers of
INCREASE TWIST DRILLS, &c.,
TAPER SHANK DRILLS,
Straight Shank Drills,
Machine Bit Drills,
Screw Driver Bits
BIT STOCK
Drills

SOCKETS,

Hand and
Shell Reamers,

Standard Gauges, Milling

Cutters and Special Tools,

Morse Taper Reamers,

Standard Patent

TWIST DRILL GRINDING MACHINE.

New York Office, 33 Chambers Street.

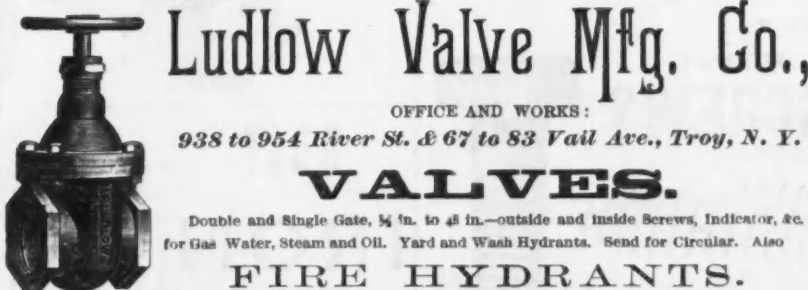


Established in 1874.

Cleveland Twist Drill Co.,

SEELEY, CHURCH & CO., 315 California St., San Francisco.

24 and 26 West Street, Cleveland, O.
101 Chambers Street, New York.
85 Queen Victoria St., London, Eng.
OTIS & BROWN, 154 Lake St., Chicago.



Ludlow Valve Mfg. Co.,

OFFICE AND WORKS:

938 to 954 River St. & 67 to 83 Vail Ave., Troy, N. Y.

VALVES.

Double and Single Gate, 1/4 in. to 48 in.—outside and inside Screws, Indicator, &c.
for Gas, Water, Steam and Oil. Yard and Wash Hydrants. Send for Circular. Also

FIRE HYDRANTS.

Morse Twist Drill & Machine Co., NEW BEDFORD, MASS.,

Manufacturers of Morse Pat. Straight-Lip Increase Twist Drills,



Bit Stock Drills, Solid and Shell Reamers, Drill Grinding Machines,

Milling Cutters,

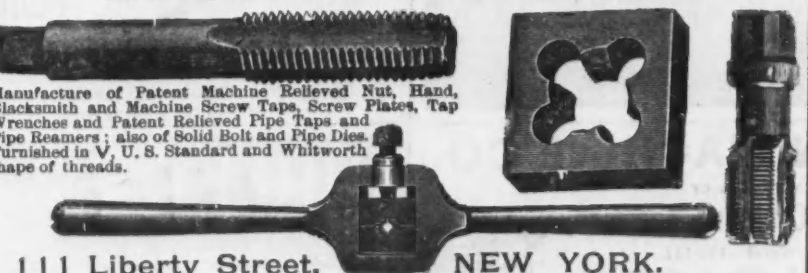
Beach's Patent Self-Centering Chucks, and Special Tools to Order.



ALL TOOLS EXACT TO WHITWORTH STANDARD GAUGES.

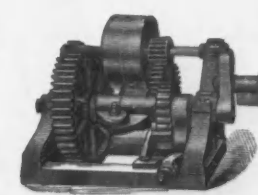
MANNING, MAXWELL & MOORE,

Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S



Manufacture of Patent Machine Relieved Nut, Hand,
Blacksmith and Machine Screw Taps, Screw Plates, Tap
Wrenches and Patent Relieved Pipe Taps and
Pipe Reamers; also of Solid Bolt and Pipe Dies.
Furnished in V. U. S. Standard and Whitworth
shape of threads.

111 Liberty Street, NEW YORK.



Peck Lifter.

PECK'S PAT. DROP PRESS
BLAST FORGES
STEEL & IRON DROP FORGINGS.
Drop Dies and Special Machinery.
BEECHER & PECK, NEW HAVEN CONN.

NEW PROCESS TWIST DRILL CO.,

MANUFACTURERS OF

Hot Forged Straight Lip Increase Twist Drills

Drills of any size or length, with Straight or Taper Shanks, made to order and to fit any socket desired.
SEND FOR CATALOGUE AND PRICE LIST.

TAUNTON, MASS.

JOS. F. CURREN, 106 Chambers St., New York, Sole Agent for New York and Vicinity.



RIVAL
STEAM PUMPS
THE
CHEAPEST
AND THE
BEST
FOR
HOT & COLD
WATER.
\$35.00
AND
UPWARDS.
SEND FOR
CATALOGUE

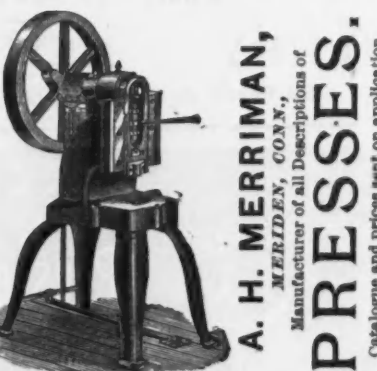
RELIANCE HYDRAULIC JACKS



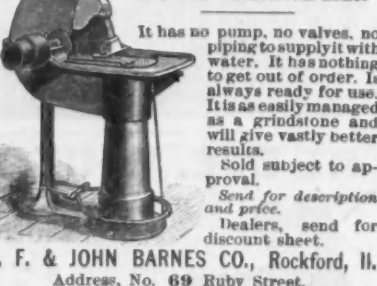
MADE IN FOUR SIZES,
to 15, 20 and 30-ton capacity, to lift 15 or 18
inches. Broad Base or Ground Lift.

DIENELT & EISENHARDT

Makers,
1308 Howard Street, Philadelphia.



A. H. MERRIMAN,
MERRIMAN, CONN.,
Manufacturer of all Descriptions of
PRESSES.
Catalogue and prices sent on application.

The Barnes Water Emery
TOOL GRINDER.

It has no pump, no valves, no
piping to supply it with
water. It has nothing to
get out of order. Is
always ready for use.
It is as easily managed
as a grindstone and
will give vastly better
results.
Sold subject to ap-
proval.
Send for description
and price.
Dealers, send for
discount sheet.
W. F. & JOHN BARNES CO., Rockford, Ill.
Address, No. 69 Ruby Street.

JUST ISSUED.

—NEW—

Illustrated Catalogue

—BY—

E. E. GARVIN & CO.,

139, 143 Centre St., - NEW YORK.

MANUFACTURERS

Milling Machines,

Drill Presses,

Hand Lathes,

Profilers, &c.

SEND FOR ONE.

Machinery, &c.



Hydrostatic Machinery,

JACKS, PRESSES, PUNCHES, ACCUMULATORS, PUMPS, VALVES, FITTINGS, &c.

POLISHING AND BUFFING MACHINERY,

WOOD WHEELS, &c., Patent Punches and Shears.

WATSON & STILLMAN, 204, 206, 208 and 210 East 43d St.

D. SAUNDERS' SONS,

MANUFACTURERS OF

Pipe Cutting and Threading Machines

For Pipe, Mill and Steam Fitters' Use.

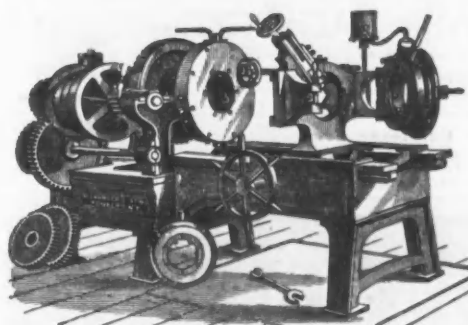
Tapping Machines

For Steam Fitting. Also

STEAM AND GAS FITTERS' HAND TOOLS,

No. 25 Atherton Street,

YONKERS, N. Y.



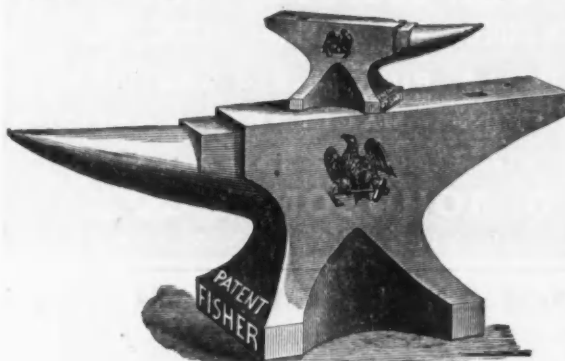
SEND FOR CIRCULARS.

ESTABLISHED 1843.

MORE THAN 200 DIFFERENT PATTERNS.

None Genuine without our Trade-Mark.

EAGLE and "FISHER" Stamp.



WARRANTED BETTER THAN THE BEST ENGLISH ANVIL

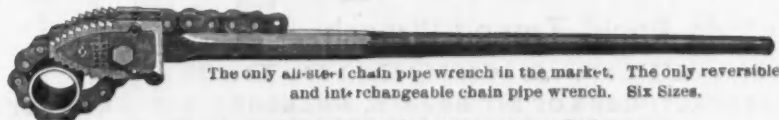
Face in one piece of BEST TOOL CAST STEEL, PERFECTLY WELDED, perfectly true, of hardest temper, and never to come off or "settle." Horn of tough untempered steel, never to break or bend. Only Anvil made in United States fully warranted as above.

FISHER DOUBLE-SCREW VISE

IS FULLY WARRANTED STRONGER THAN ANY OTHER LEG VISE, AND ALWAYS PARALLEL. Is the best Vise for Machine Shops and Blacksmiths, and for all heavy work. ACCURATE AND DURABLE. Send for Circular.

EAGLE ANVIL WORKS, TRENTON, N. J.

BROCK'S PATENT DROP FORGED CHAIN PIPE WRENCH.



The only all-steel chain pipe wrench in the market. The only reversible and interchangeable chain pipe wrench. Six Sizes.

J. H. WILLIAMS & CO.,

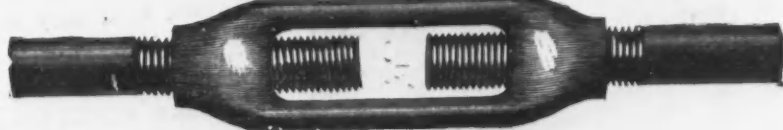
Drop Forgings of Every Description, 9 RICHARDS STREET, BROOKLYN, N. Y.



PORT CHESTER BOLT & NUT CO., Port Chester, N. Y., MANUFACTURERS OF

BOLTS, NUTS, RIVETS and WASHERS, CHAMFERED AND TRIMMED SQUARE AND HEXAGON NUTS A SPECIALTY.

PRESSED WROUGHT IRON.



THE BEST AND CHEAPEST

Made by CLEVELAND CITY FORGE & IRON CO., Cleveland, Ohio.

Merrill Brothers, 26 First Street, BROOKLYN, N. Y.



Drop Forged.

Machinery, &c.

HIGH-SPEED POWER TRAVELING CRANES.

We are now prepared to build **High-Speed Power Traveling Cranes** for any capacity of load, any length of runway and any width of span, with one or with two trolleys on the bridge. These trolleys to work either slow or fast, together or independently, in like or in opposite directions, horizontally or vertically, while the bridge can be traversing slow or fast at the same time in either direction. The speeds of bridge on runway are 100 feet and 200 feet per minute; the speeds of trolleys on bridge are 50 feet and 100 feet per minute; and there are four hoisting speeds of 5, 10, 20 and 40 feet per minute; all can be varied quickly without the least shock or jar from zero to maximum or to any intermediate speed. The load is always automatically sustained, thus avoiding absolutely the great danger and anxiety which are inseparable from the use of those cranes which require the operator to apply the brake. We have had one of these Cranes of 26 tons capacity in constant use in our foundry for nearly two years and we offer them with full confidence for the greatest range of service. We invite the correspondence of parties interested in the subject.

WM. SELLERS & CO., Incorporated, Philadelphia, Pa. July, 1887.

SOUTHWARK FOUNDRY AND MACHINE CO.,

ENGINEERS AND MACHINISTS,

WASHINGTON AVE., and FIFTH ST., PHILADELPHIA, PA.

PORTER-ALLEN and SOUTHWARK ENGINES, BOILERS and TANKS, BLOWING ENGINES, BESSEMER CONVERTERS, GAS APPARATUS, SUGAR MACHINERY, HYDRAULIC MACHINERY, &c., &c.

MORSE ELEVATOR WORKS.

MORSE WILLIAMS & CO. Successors to CLEM & MORSE.

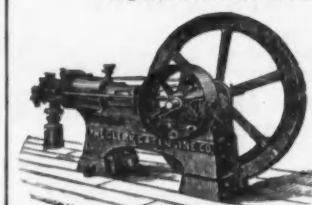
Manufacturers and Builders of all kinds of PASSENGER and FREIGHT

ELEVATORS.

OFFICE: 411 Cherry Street. Works: Frankford Ave., Will Shackamaxon Street PHILADELPHIA. 108 Liberty Street.

THE CLARK GAS ENGINE.

Highest Award for Gas Engines at American Institute Fair, New York, 1883.



Makes an ignition at every revolution of the Fly Wheel. Is started with ease, and gives full power immediately. No danger from fire; no extra insurance nor skilled engineer required. Runs perfectly steady; only uses gas when required. Workmanship of the best description and guaranteed. Indicated power considerably larger than in any other Gas Engine of the same size, each Engine giving from 1 H.P. to 4 H.P. more than named. Is unsurpassed by any other Gas Engine for running any kind of machinery or electric light, arc or incandescent. Has means for regulating to suit any coal or water gas.

No Boiler, Coal, Ashes or Engineer. Made in Sizes of 4, 8, 10, 15 and 25 H.P.

THE CLARK GAS ENGINE CO., 1012-1016 Filbert St., Philadelphia. Branch Offices: 142 Chambers St., New York; 4 West 14th St., New York; 24 Dearborn St., Chicago.

Otto Gas Engine Agency

NEW YORK,

A. C. MANNING & CO., 47 Dey Street,

REMOVED ON MAY 1st,

TO

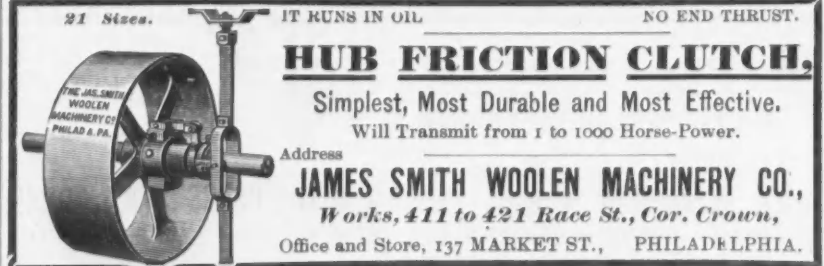
18 VESEY STREET.

"LITTLE GIANT TIRE UPSETTER."



Cheapest and most durable and easiest worked of any in the market. LIBERAL DISCOUNT TO THE TRADE.

Manufactured by CALLAHAN & DOUGLAS, Binghamton, N. Y.

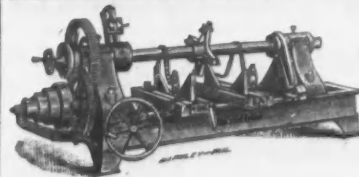


HUB FRICTION CLUTCH.

Simplest, Most Durable and Most Effective. Will Transmit from 1 to 1000 Horse-Power.

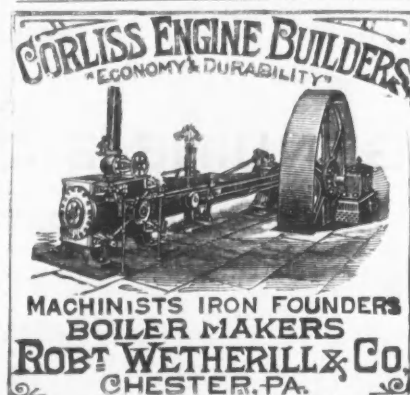
Address JAMES SMITH WOOLEN MACHINERY CO., Works, 411 to 421 Race St., Cor. Crown, Office and Store, 137 MARKET ST., PHILADELPHIA.

Cylinder Boring and Facing Machine



Will bore from 8" to 22" Cylinders, facing off the ends and boring at same time. It is built neat, strong and powerful, and sells at moderate price. 22-Circulars on application. PEDRICK & AYER, Philadelphia, Pa.

Machinery, &c.



CORLISS ENGINE BUILDERS "ECONOMY & DURABILITY" MACHINISTS IRON FOUNDERS BOILER MAKERS ROBT WETHERILL & CO. CHESTER, PA.

Stow Flexible Shaft Co., Limited,

2220 Pennsylvania Ave.,

PHILA., PA.,

Manufacturers of

PORTABLE DRILLING,

TAPPING, REAMING

and BORING MACHINES

Also tools for Emery Wheels

Grinding, Metal and Wood Pol-

ishing, Cattle Brushing and

Circlips, &c. Gen'l European Agents, Bolling & Lowe, Lawrence Pountney Hill LONDON, ENG.

PHILA. SHAFTING WORKS,

GEO. V. CRESSON

18th & Hamilton Sts.,

PHILA.

SHAFTING

A SPECIALTY

Manufacturers of

Shafting, Pulleys and

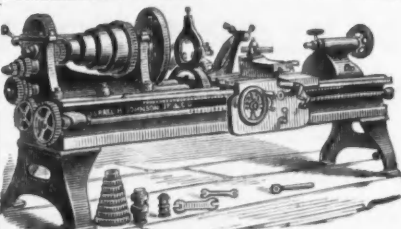
Hangers, Couplings

and every appur-

tance used in the

Transmission of

Steam Power.



ISRAEL H. JOHNSON, Jr., & CO.,

Tool and Machine Works

MANUFACTURERS OF

SPECIAL MACHINERY,

Improved Machinists' and Brass

Finishers' Tools.

OFFICE, 1422 CALLOWHILL STREET

PHILADELPHIA, PA.

Established 1867.

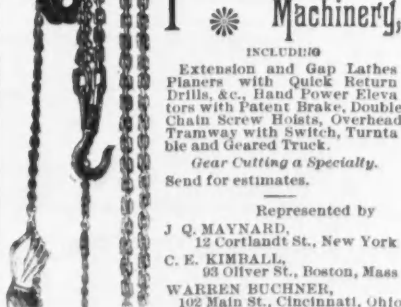
E. Harrington, Son & Co.,

Works and Office.

Cor. N. 15th St. & Penn Ave.

Phila., Pa., U. S. A.,

Manufacturers of a full line



Iron-Working

Machinery,

INCLUDING

Extension and Gap Lathes

Planers with Quick Return

Drills, &c., Hand Power Eleva-

tors with Patent Brake, Double

Chain Screw Hoists, Overhead

Tramway with Switch, Turna-

ble and Geared Truck.

Gear Cutting a Specialty.

Send for estimates.

Represented by

J. Q. MAYNARD,

12 Cortlandt St., New York

C. E. KIMBALL,

63 Oliver St., Boston, Mass

WARREN BUCHNER,

102 Main St., Cincinnati, Ohio

HOWARD IRON WORKS

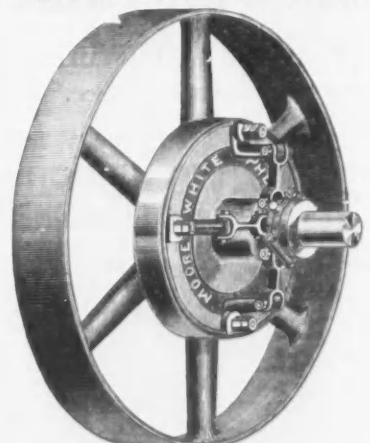
BUFFALO, N. Y.,

Manufacturers of

BENCH VISES.

Price Lists sent on application.

Patent Friction Clutch.



MANUFACTURED BY

MOORE & WHITE,

1312 Buttonwood St., Philadelphia, Pa.

Send for DESCRIPTIVE CIRCULAR and PRICE LIST

Tubal Smelting Works,

760 and 762 South Broad Street, PHILADELPHIA.

Paul S. Reeves,

MANUFACTURER OF

GENUINE BABBITT METAL

AND ALL GRADES OF

ANTI-FRICTION METALS.

Special Notice.—We call attention to our new mixture, THE P. S. R. "SPECIAL HARD" BABBITT. Equal to genuine, at 20 per cent. less price. Has now been in use about one year and thoroughly tested.

STANDARD STEEL CASTING CO.
THURLOW, PA.
OPEN HEARTH AND CRUCIBLE
STEEL CASTINGS
QUALITY EQUAL TO STEEL FORGINGS

ESTABLISHED:
Spring Making, 1842. Steel Making, 1845. Norway Iron, 1871 (Re-Rolled).

WM. & HARVEY ROWLAND,
MANUFACTURERS OF
Springs, Steel, Re-Rolled Norway
Iron & Slit Norway Nail Rods.
ADDRESS:
FRANKFORD P. O., PHILADELPHIA.

EXTRA
SUPERIOR
CAST
TOOL
STEEL
STEEL TUBES
WELDLESS
COLD DRAWN
SMOOTH INSIDE AND OUT
JOHN S. LENG, 4 FLETCHER ST. NEW YORK.

SAYLOR'S PORTLAND CEMENT.

Celebrated for its great strength and uniform quality. Especially adapted for use in the construction of Machinery Floors, Foundations for heavy Machinery, Engines, Blast Furnaces and any and all Wet or Dry work requiring great strength and solidity. Used for the past ten years for the annual repairs of the Croton Aqueduct, New York; also for the new Aqueduct, the Mississippi and New York Harbor Jetties, New York and Brooklyn Bridge (at critical points), Hudson River Tunnel, New Albany (capital), Lighthouse Dept. (Gen'l Duane in charge) and other prominent work.

GENERAL AGENTS,
JOHNSON & WILSON, 41, 43 & 45 Broadway, New York.

ROP HAMMERS.
Punching Presses.
DIES AND OTHER TOOLS
FOR THE MANUFACTURE OF ALL KINDS OF
SHEET METAL GOODS,
DROP FORGINGS, &c.
Stiles & Parker Press Co.,
MIDDLE TOWN CONN.

Branch Factory and Office: 203, 205 & 207 Centre St., New York.

JENKINS STANDARD PACKING
TRADE MARK

The Original Unvulcanized Packing
CALLED THE STANDARD—As it is the Packing by which
all others are compared.
Accept no packing as JENKINS PACKING unless
stamped with our "Trade Mark."

JENKINS BROS.,
71 John St., New York. 105 Milk St., Boston.
18 S. Fourth St., Phila. 54 Dearborn St., Chicago.

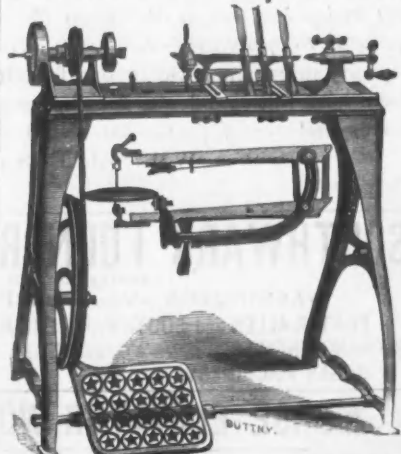
SHEPARD HARDWARE CO.
MAMMOTH
FOUNDRY.
BUFFALO, N.Y.

STEARN'S
BENCH DRILL
LOW IN PRICE.
HIGH IN FINISH.
24 inches high. Run of
Screw, 5 1/4 inches. Bearings
carefully finished with stand-
ard reamers. All
parts interchangeable.
Extension crank for
large drilling. Chuck holds 3/4
round or tapered square drill
FOR SALE BY THE TRADE
OF
E. C. STEARN & CO.
SYRACUSE, N.Y.

STUART'S WINDOW
SCREEN FRAME.
Low in Price.
Elegant in Finish.
No Corner Irons.
No Carpenter Work.
No Mitring.
Finished in Black
Walnut Stain.
FOR SALE BY THE
JOBBER TRADE.
MANUFACTURED BY
E. C. STEARN & CO.
SYRACUSE, N.Y.

STANLEY G. FLAGG & CO.,
PHILADELPHIA, PA.
Office and Works,
N. W. Cor. 19th St. and Pennsylvania Ave
MANUFACTURERS OF
STEEL CASTINGS
A Substitute for Steel and Wrought Forgings.
Circulars Sent on Application.

STEEL CASTINGS
Railroad and Machine Castings,
Locomotive Cross
Heads and Gearing a Specialty
Eureka Cast Steel Co.,
307 Walnut St., PHILADELPHIA.



This Goodell Lathe and Scroll Saw is the
very latest improved in all respects. It is thor-
oughly built and highly finished. Length of Bed,
24 inches. No one who sees it will buy any other
kind. Lathe, with all needed tools, \$10.00. Scroll
Saw Attachment, extra, \$2.00. Forwarded on re-
ceipt of the price, or dealers will furnish it on
request. Also manufacturers of the Lester,
Rogers and Cricket Saws. Headquarters for Star
Bracket and Hack Saws, and dealers in all Scroll
Sawing Supplies.

MILLERS FALLS CO.
93 Reade St., New York.

FINE TAPS AND DIES.

LIGHTNING AND GREEN RIVER
SCREW PLATES
BOLT CUTTERS, HAND AND POWER.
DRILLING MACHINES, PUNCHING PRESSES,
TIRE BENDERS, TIRE UPSETTERS
And Other Labor Saving Tools.
Send for Price List.

WILEY & RUSSELL MFG. CO., Greenfield, Mass.
Buffalo Forge Co.,
BUFFALO, N. Y.,
MANUFACTURE FULL LINE
Portable and Stationary Forges, Heating Fur-
naces, Power Blowers, Ex. Fans, and Black-
smiths' and Machinists' Drills.

JUST ISSUED!
AND MAILED FREE ON APPLICATION.
Catalogue No. 5, Jan. 1, 1887.
CLAYTON
AIR COMPRESSORS,
ROCK DRILLS,
And General Mining Machinery.
For CATALOGUES, ESTIMATES, Etc., Address
Clayton Air Compressor Works,
Office, 43 Dey St., New York.

STEARN'S
Hay Fork Pulleys.
With Hardened Chilled
Bearings.
Pins can be removed
to permit the rope to be
put in or taken off, or
for oiling. The Swivel
Eyes are turned and
work perfectly free.
They are the Cheapest Pul-
leys in the Market.
MANUFACTURED BY
E. C. STEARN & CO.
SYRACUSE, N. Y.
Send for Circular A.

A. G. PECK & CO.,
Cohoes, N. Y.,
MANUFACTURERS OF
AXES, ADZES,
BROAD AXES,
HATCHETS.
Send for Catalogue and Price
List.

SCRANTON BRASS & FILE WORKS.
J. M. EVERHART,
Manufacturer of
BRASS WORK
For Water, Gas and Steam.
Exhaust Steam Injector, using Waste
Steam only, returning it to Boiler
with water at 100 degrees.
Also PATENT
CUT FILES.
Scranton, Pa.

BRADLEY'S
UPRIGHT
CUSHIONED
HELVE
HAMMER
Combines all the
best elements es-
sential in a first-
class Hammer.
Has more good
points, does
more and
better work
and costs
less for re-
pairs than
any other Hammer in the World.
BRADLEY & CO. Syracuse, N.Y.

BRADLEY'S Heating Forges
ESTABLISHED 1882
For Hard Coal or Coke. Indispensable in all shops
to keep Bradley's Cushioned Hammers and
men fully employed and reduces cost of production.
BRADLEY & CO. Syracuse, N.Y.

RUSSELL, BURDSALL & WARD,
PORTCHESTER, N. Y.,
MANUFACTURERS OF
CARRIAGE, FLOW, STOVE, &c.
BOLTS

Carriage Bolts made from Best Square Iron a Specialty.

AXLES SPRINGS
F. W. WURSTER,
SPRING and
AXLE WORKS.
375 to 387 Kent Ave.,
BROOKLYN, N. Y.
Send for Price List and Discounts.

FOOT POWER MACHINERY.
The Latest and Most Improved.
For Carpenters, Builders, Cabinet Makers, Pattern Makers,
and all Wood Workers who are without Steam Power.
Scroll saws, Circular Saws, Mortising Machines, Lathes, Etc.
New Catalogue Free.
SENECA FALLS MFG. CO.,
255 Water St., Seneca Falls, N. Y.

SOLID STEEL CASTINGS,
FROM CRUCIBLE and OPEN HEARTH.
HYDRAULIC CYLINDERS AND GEARING SPECIALTIES.
CUN METAL ROLLS, PINIONS and CASTINGS.
AIR-FURNACE REFINED MALLEABLE CASTINGS.

All Steel used by us is SUBJECT to CHEMICAL ANALYSIS in our own LABORATORY.
ISAAC G. JOHNSON & CO.,
Established 1853.
SPUYTEN DUYVIL, NEW YORK CITY.

PITTSBURGH STEEL CASTING CO.,
26TH AND RAILROAD STS., PITTSBURGH, PA.
MANUFACTURERS OF
Refined Bessemer Steel; Improved Steel Castings
UNDER HAINSWORTH'S PATENTS.

We are now prepared to fill orders for refined BESSEMER BILLETS or BLOOMS of
any desired carbon and a uniform quality.
We would call attention of consumers to the fact that we use good material, and produce a steel
pronounced by competent judges equal to the best English or German spring and soft steel.
Having had twelve years' experience in the making of STEEL CASTINGS, we are able
to refer to our customers in all parts of the United States and Canada as to the quality of our work in
this line. We make castings of steel practically free from blow-holes, as soft and easily worked as
wrought iron, yet stiff, strong and durable, with a tensile strength of not less than 65,000 pounds to
the square inch. In short, our castings unite the qualities of steel and wrought iron.
Wheels, Pinions, Cranks, Dies, Hammer Heads, Engines and Machinery Castings of all descrip-
tions, Railroad Frogs and Crossings, Plowshares, Moldboards and Landslides.
Special attention given to Heavy Castings. We use no cast-iron in our Castings. Send for circular.

Buffalo Rapid Transit Wrench.
SAXTON & OSGOOD, Buffalo, N. Y.
MANUFACTURERS OF BIT BRACES, WRENCHES, BUTTER SPADES
BARN DOOR HANGERS, BROOM HOLDERS, &c.

HERO SPRING HINGES.
SINGLE ACTING,
FOR
Screen Doors.

These Hinges are made
with the "HOLDBACK"
feature, i. e., they will
close a door or hold it
open, as desired.
The only Spring Hinge
of this class with a
Covered Spring.
The Spring is encased
in an Iron Tube, and is
thereby protected from
dust and rain. The
Hinges are packed with
the tension of the springs
adjusted, ready for im-
mediate use.
MANUFACTURED BY
VAN WAGONER & WILLIAMS CO.,
82 BECKMAN ST., NEW YORK.

Published by DAVID WILLIAMS, 66 and 68 Duane St., New York.
Printed by THE WILLIAMS PRINTING CO., General Book, Commercial and Newspaper Printers and Binders
Nos. 4, 7 and 9 Elm St., New York.